CHEMICAL AND PETROLEUM ENGINEERING EXHIBITION PREVIEW

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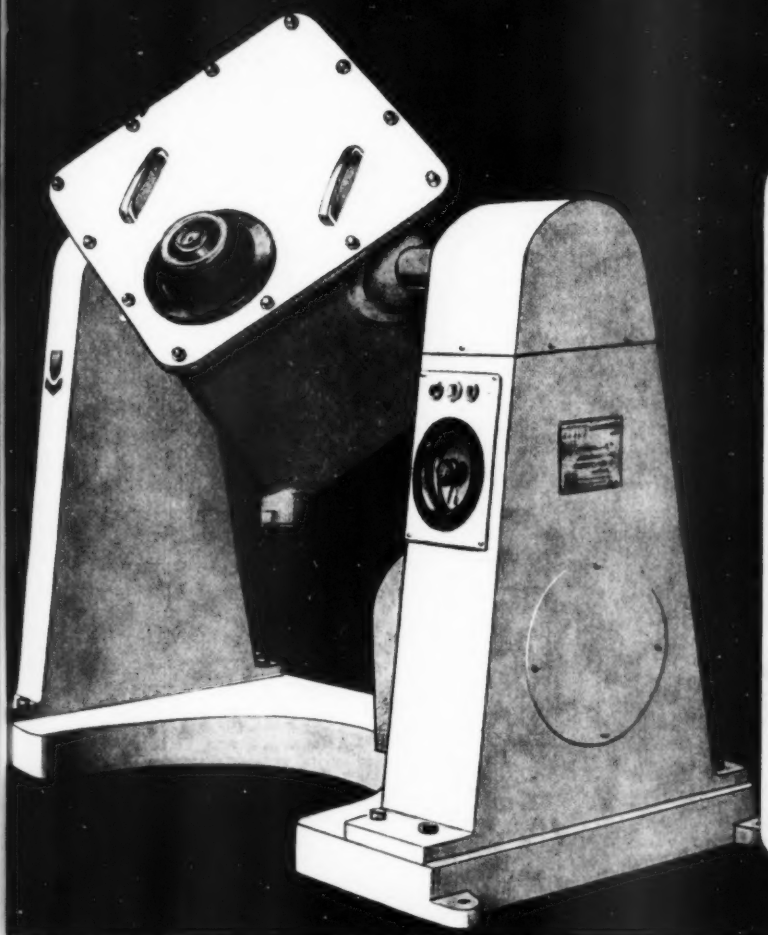

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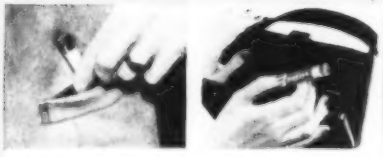

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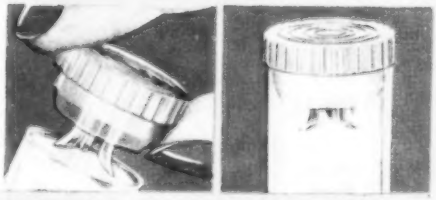

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INDEX TO ADVERTISERS

	Page
A.P.V. Co. Ltd., The	A16
Albro Fillers & Engg. Co. Ltd.	May
Alginate Industries Ltd.	A80
Alite Machines Ltd.	May
Allen, Stafford, & Sons Ltd.	May
Allied International Co. Ltd.	A94
Alwitt Trading Co. Ltd.	A8
Amplex Appliances (Kent) Ltd.	May
Anderson, C. F., & Son Ltd.	May
Arden, H. B., & Co. Ltd.	A90
Armstrong Cork Co. Ltd.	May
Arthol Ltd.	A26
Ashby, Morris, Ltd.	A66
Astor Boisselier & Lawrence	A33
B.U. Supplies & Machinery Co. Ltd.	A54
Baird & Tatlock (London) Ltd.	April
Baker Platinum Ltd.	A52
Barter Trading Corporation	A44
Beatson, Clark & Co. Ltd.	A67
Becker & Co. Ltd.	May
Beckman Instruments Ltd.	May
Bencard, C. L. Ltd.	A73
Benjamin Electric Ltd.	May
Berk, F. W., & Co.	A94
Betts & Co. Ltd.	April
Birlec Ltd.	A48
Bramigk & Co. Ltd.	A64
Briggs, S., & Co. Ltd.	A83
British Ceca Co. Ltd.	May
British Celanese Ltd.	A19
British Drug Houses Ltd., The	A4, A69
British Industrial Solvents Ltd.	April
British LaBour Pump Co.	A13
British Railways	A88
Broadbent, Thomas, & Sons Ltd.	A10
Brome & Schimmer Ltd.	May
Brown, Arthur, & Co. Ltd.	May
Burroughs Wellcome & Co. Ltd.	A14
Bush, Beach & Gent Ltd.	A96
Bush, W. J., & Co. Ltd.	A17
Butterfield, W. P., Ltd.	May
Calfos Ltd.	May
Cambridge Instrument Co. Ltd.	April
Cannon (C.P.) Ltd.	A61
Carless, Capel & Leonard Ltd.	May
Carlson, John C., Ltd.	A78
Chelton (Electrostatics) Ltd.	A82
Chemapol	May
Chemical Compounds Ltd.	Mar.
Chemical & Petroleum Engineering Exh.	May
Chemicals & Feeds Ltd.	A96
Chilean Iodine Educational Bureau	A84
Clark, T. & C., Ltd.	A89
Clarke Built Ltd.	Mar.
Classified Advertisements	A97, A98
Cleveland Meters Ltd.	Feb.
Coalite & Chemical Products Ltd.	A65
Cocker Chemical Co. Ltd.	A74
Cohen, George, Sons & Co. Ltd.	A55
Couper, Friend & Co. Ltd.	A96
Cow, P. B., & Co. Ltd.	May
Cox, Arthur H., & Co. Ltd.	A56
Croda Ltd.	May
Cumming, J. W., & Son Ltd.	A96
Cyclo Chemicals Ltd.	A35
Dalmas Ltd.	April
Dawson Bros. Ltd.	A58
Deckelmann, Josef	May
Dehydag	A83
Delf, W. M. (Liverpool) Ltd.	A90
Distillers, The, Co. Ltd.	A11
Dore, John, & Co. Ltd.	May
Dragoco	May
Dutton & Renisch Ltd.	May
Electrothermal Engineering Ltd.	A76
Enamelled Metal Products Corporation	A41
Engineering Dev. (England) Ltd.	A84
English Clays, Lovering Pochin & Co. Ltd.	A93
Evans Chemicals Ltd.	Mar.
Evans, Norman, & Rais Ltd.	April
Evode Ltd.	A7
Excorna	A94
Farrow & Jackson Ltd.	A86
Fatoils Ltd.	May
Ferranti Ltd.	Mar.
Fifer, A., Ltd.	Mar.
Firth Vickers Stainless Steels Ltd.	May
Flexile Metal Co. Ltd.	April
Fluid Equipment Co. Ltd.	A95
Follsain-Wycliffe Foundries Ltd.	May
Ford, T. B., Ltd.	A20
Foster, Yates & Thom Ltd.	Cover 1
Fraser, W. J., & Co. Ltd.	A42
Freeman, Wm., & Co. Ltd.	Feb.
Fritsch, Rudolph, W.	A90
Funditor Ltd.	Mar.
Gale, Ronald, & Co. Ltd.	May
Gallenkamp, A., & Co. Ltd.	April
Gardner, Wm., & Sons (Gloucester) Ltd.	A21
Gibbs, Antony, & Sons Ltd.	A94
Giusti, T., & Son Ltd.	May
Givaudan, L., & Co. Ltd.	A57
Glass Containers Ltd.	A72
Glastics Ltd.	May
Glaxo Laboratories Ltd.	A60
Glen Creston Ltd.	A84
Glovers (Chemicals) Ltd.	A59
Gosheron, John, & Co. Ltd.	April
Graesser Salicylates Ltd.	A70
Graesser-Thomas, H. W., Ltd.	May
Griffin & George Ltd.	Feb.
Gurr, Edward, Ltd.	A96
Hall & Lane Ltd.	A86
Hanna, Victor E., Ltd.	May
Hanover Fair	April
Harrison Carter, J., Ltd.	A80
Harvey, G. A., & Co. (London) Ltd.	A85
Hathernware Ltd.	A65
Haworth (A.R.C.) F., Ltd.	May
Heinz, Carl Aug.	Mar.
Herbst, F., & Co.	A96
Heston Equipment Co. Ltd.	A23
Hilger & Watts Ltd.	May
Hobart Mfg. Co. Ltd.	A87
Hoechst Chemicals Ltd.	May
Honeywill Atlas Ltd.	May
Honeywill & Stein Ltd.	May
Horner, L. A., & Sons Ltd.	May
Hough, Hoseason & Co. Ltd.	Mar.
Ideal Capsules Ltd.	A76
Impact Extrusions Ltd.	Cover 4
Imperial Chemical Industries Ltd.	Cov. 3, A31, A34
International Bottle Co. Ltd.	May
Isopad Ltd.	A29
Ivers-Lee Ltd.	Feb.
Jacobson Van Den Berg & Co. (U.K.) Ltd.	A84
Johns, Son & Watts Ltd.	Mar.
Johnsen & Jorgensen Ltd.	May
Johnson, S. H., & Co. Ltd.	May
Jones, Samuel, & Co. Ltd.	A79

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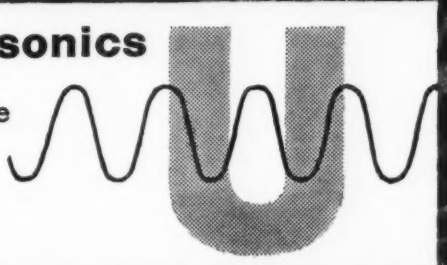
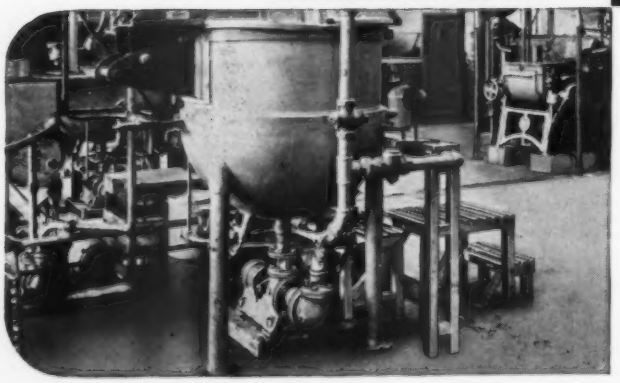


INDEX TO ADVERTISERS

	Page
Kaylene (Chemicals) Ltd.	A87
Kek Ltd.	A24
Kellys, John, (London) Ltd.	A88
Kemball, Bishop & Co. Ltd.	A62
Kemwall Engineering Co.	April
Kendall, F., & Son Ltd.	A94
Kestner Evaporator & Engg. Co. Ltd.	A64, A68
Kiessling, Quarzschmelze Erich	Mar.
Kolmar Cosmetics (England) Ltd.	May
Kork-N-Seal Ltd.	A27
K. W. Chemicals Ltd.	A92
Laboratory Apparatus & Glassblowing Co.	April
Lankro Chemicals Ltd.	May
Lattimer, H.	A96
Lautier Fils	Mar.
Lavino (London) Ltd.	April
Lawtons of Liverpool Ltd.	A68
Lax & Shaw Ltd.	May
Lennox Foundry Co. Ltd.	A81
Leverton Myers Ltd.	May
Link, Alfred	May
M.G.K. Engineering Co. Ltd.	A52
McKesson & Robbins Ltd.	A96
Manesty Machines Ltd.	May
Manlove Alliott & Co. Ltd.	May
Manning, A. J., Ltd.	May
Marchon Products Ltd.	A47
Marston Excelsior Ltd.	Feb.
May & Baker Ltd.	A22
Metafiltration Co. Ltd., The	April
Metal Box Co. Ltd., The	Cover 2
Metal Hydrides Inc.	May
Miller, P. & L., Ltd.	A37
Mitchell, L. A., Ltd.	Mar.
Mono Pumps Ltd.	A6
Monsanto Chemicals Ltd.	A43
Morgan Fairest Ltd.	A45
Moritz Chemical Engg. Ltd.	May
Morson, Thomas, & Son Ltd.	A93
National Glass Works (York) Ltd.	A30
Olley, C., & Sons Ltd.	A86
Page, Chas., & Co. Ltd.	A96
Palfrey, Wm. Ltd.	A50
Pascall Engineering Co. Ltd.	A85
Paterson Engineering Co. Ltd.	A72
Pearce, L. R. B., Ltd.	May
Pearlite Box Co. Ltd.	A89
Peerless & Ericsson Ltd.	A9
Permutit Co., The	April
Petrochemicals Ltd.	May
Pharmaceutical Press, The	May
Philips Electrical Ltd.	April
Plastic Closures Ltd.	April
Plenty & Son Ltd.	A62
Polak & Schwartz Ltd.	A28
Poth, Hille & Co. Ltd.	A78
Potter & Clarke Ltd.	A91
Powell Duffryn Ltd.	May
Premier Colloid Mills Ltd.	A71
Pulverizing Machinery Ltd.	A18
Purdy Machinery Co. Ltd.	A82
Pyrene Co. Ltd.	A58
Pyrethrum Board of Kenya	May
Q.V.F. Ltd.	A15
Reed, R. F., Ltd.	A81
Reed Corrugated Cases Ltd.	A63
Rejafix Ltd.	May
Renham & Romley Ltd.	May
Rexolin Chemicals	A82
Rhone-Poulenc, Soc. de Usines Chimiques	May
Richford, E. M., Ltd.	A88
Roberts Patent Filling Machine Co. Ltd.	A60
Robinson Brothers Ltd.	May
Robinson & Sons Ltd.	A75
Roche Products Ltd.	A3
Ronsheim & Moore Ltd.	May
Roussell Laboratories Ltd.	May
Rubeck, H., Ltd.	A92
Saniguard Appliances Ltd.	April
Scan	May
Scherer, R. P., Ltd.	May
Sellotape Industrial	A40
Service Electric Co. Ltd.	A56
Shell Chemical Co. Ltd.	A25
Siemsgluss, Frido	May
Silverson Machines (Sales) Ltd.	A91
Simpson, W. S., & Co. Ltd.	A96
Sipon Products Ltd.	May
Smith, T. & H., Ltd.	A36
Southern Apparatus Co. Ltd.	A95
Stainless Steel Vessels (London) Ltd.	A51
Standard Synthetics Ltd.	May
Star Machinery Pty. Ltd.	April
Steel, J. M., & Co. Ltd.	A53
Stephens Bros. & Banner Ltd.	May
Sturge, J. & E., Ltd.	May
Sturtevant Engineering Co. Ltd.	A49
Sutalite Ltd.	May
Sutcliffe Speakman & Co. Ltd.	Feb.
Taylor Rustless Fittings Co. Ltd.	A70
Tennants (Lancashire) Ltd.	A90
Thames Board Mills Ltd.	May
Thompson & Capper Ltd.	A12
Tickopres Div., Dapag (1943) Ltd.	Feb.
Tillotson & Sons Ltd.	April
Trade Agents for Mysore	A88
Trade Commissioner for the British West Indies, British Guiana and British Honduras	A94
Trapow, D., & Co. Ltd.	May
Tungstone Products Ltd.	May
Ultrasonics Ltd.	A5
Union Carbide Ltd.	A39
United Glass Bottle Manfrs. Ltd.	May
United Indigo & Chemical Co. Ltd.	A94
Universal Metal Products Ltd.	May
Universal Oil Co. Ltd.	A77
Venesta Ltd.	A46
Viscose Development Co. Ltd.	A38
Voss Instruments Ltd.	A86
Warwick Production Co. Ltd.	May
Wass, Pritchard & Co. Ltd.	Mar.
Weatherfoil Heating System Ltd.	Mar.
Weddel Pharmaceuticals	A54
Welch, J. A. (Plant & Vessels) Ltd.	May
Westbrook Lanolin Co.	April
Whaley, The, Bridge Partnership Ltd.	April
White Sea and Baltic Co.	May
Willcox, W. H., Co. Ltd.	A32
Woodhams, Dade & Co.	A92
Wood-Wool & Fibre Co. Ltd.	April



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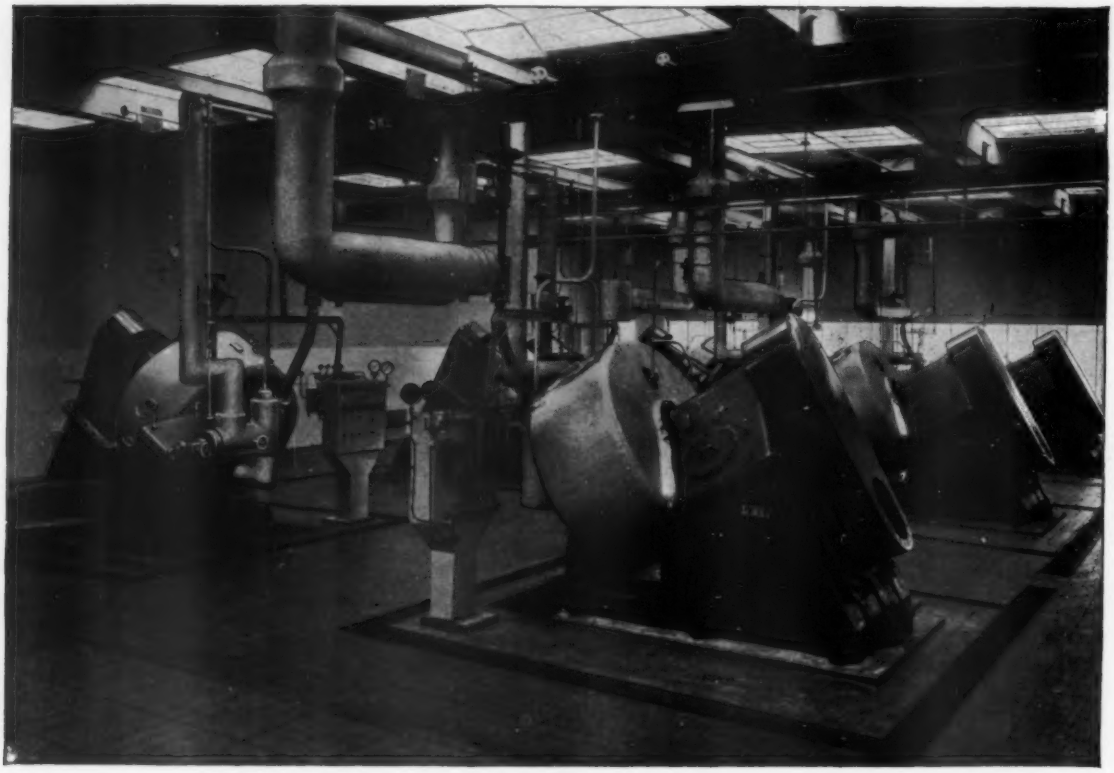

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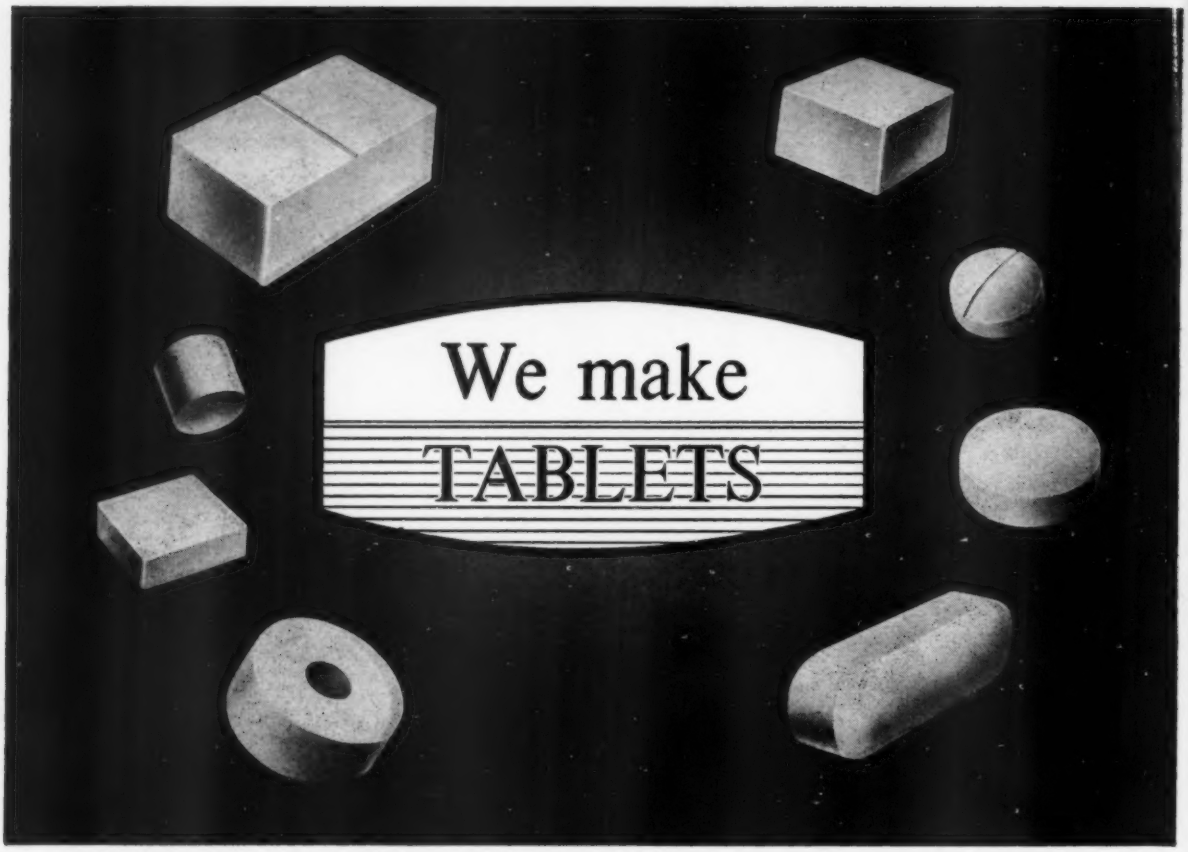

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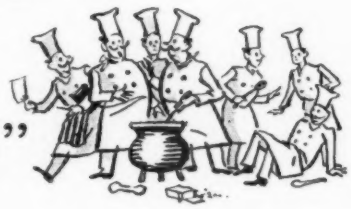
"Too many cooks spoil the broth" 

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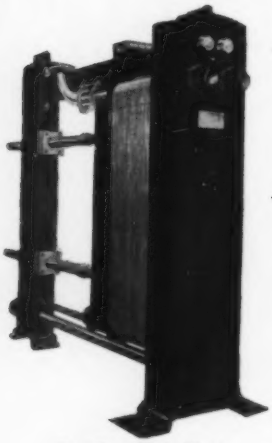

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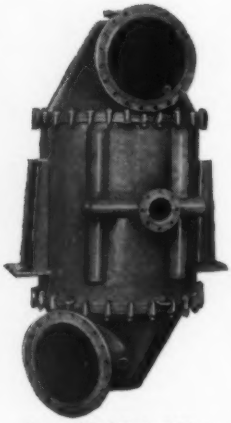
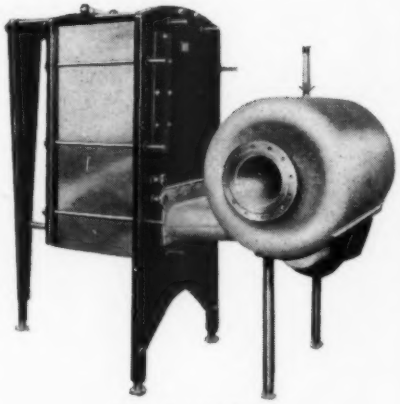


Rosenblad Spiral Heat Exchanger

EVAPORATION



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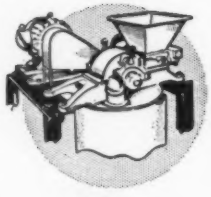
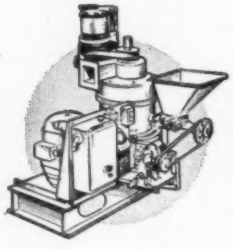


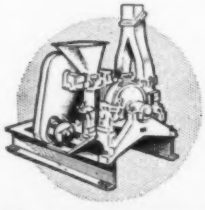
The Mikro-Pulverizer

A high speed mechanical pulverizer offering a wide range of particle sizing, (10-300 mesh) safe and economical for both wet and dry grinding. Available in six sizes with capacities from 10-10,000 lbs. per hour.



The Mikro-Bud

A new vertical hammer mill with built-in air classifier for the reduction of solids to within the 80-10 micron range. Particle sizing can be changed in seconds while the machine is in operation.
10°F maximum temperature rise.
Available in two sizes giving 35/70 lbs. per hp/hour.



The Mikro-Atomizer

A mechanical, screenless mill for the production of smooth, ultra-fine powders in the lower micron range (25-1 microns). Compact and highly efficient. Available in three sizes with capacities from 5-5,000 lbs. per hour.

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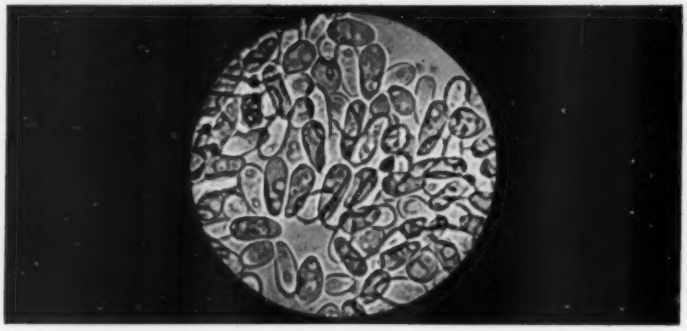

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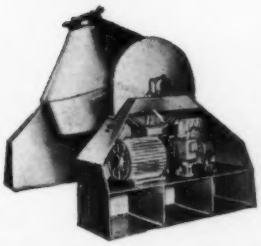

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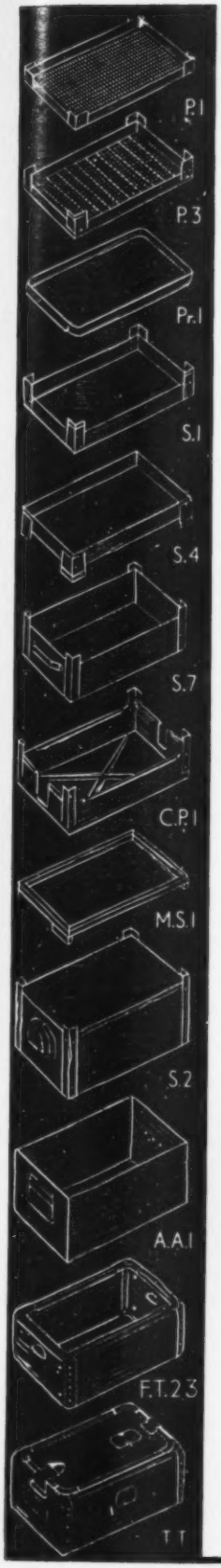

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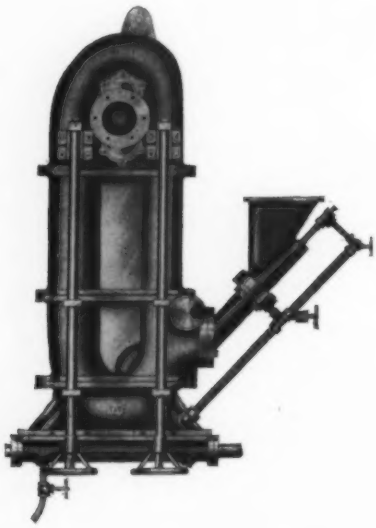
The MINIKEK (*left*) is the smallest mill in this range and embodies the many recent improvements in design.

finer

Designed primarily to produce powders in the sub-sieve range, the SUPERKEK (*right*) has also proved of immense value in grinding materials of an inherently sticky nature such as D.D.T. and Lactose, which rapidly clog conventional pulverisers. More generally, this mill yields products with a top size of 40-50 microns and with an average particle size of approximately 10 microns.



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The model 0405 JET-O-MIZER (*left*) is the latest fluid energy mill in its field. Its many applications range from the milling of insecticides to World Health Organisation specifications to the ultra fine grinding of pigments for rapid dispersion in high-speed paint mills. Materials as abrasive as carborundum are handled with ease, and powders with a top size of 5 microns and average particle size of less than 1 micron are economically produced. JET-O-MIZERS are marketed by KEK Limited under exclusive licence from the Fluid Energy Processing and Equipment Company, U.S.A.

Illustrated literature on the full range of KEK Mills is available on request.

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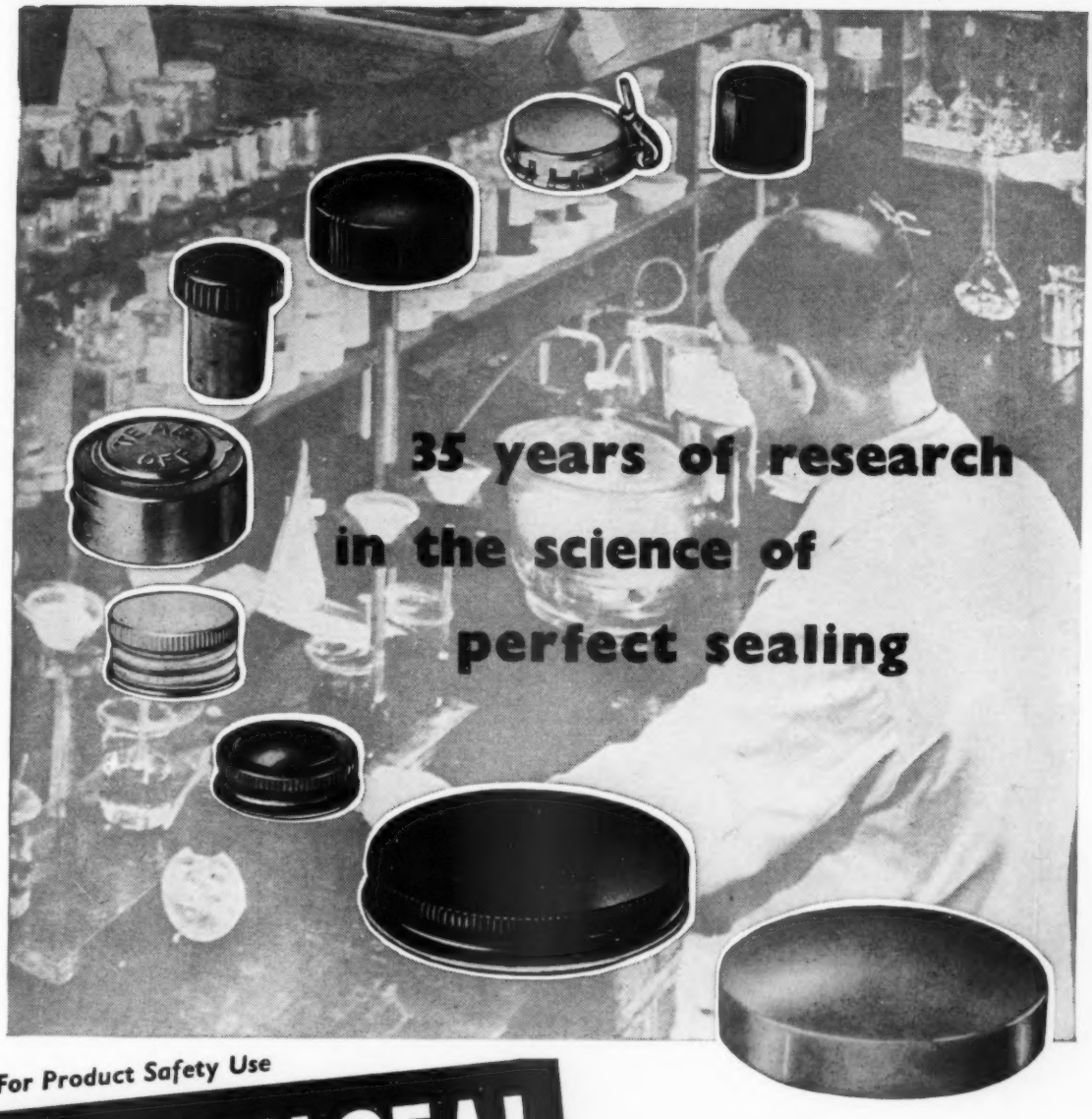

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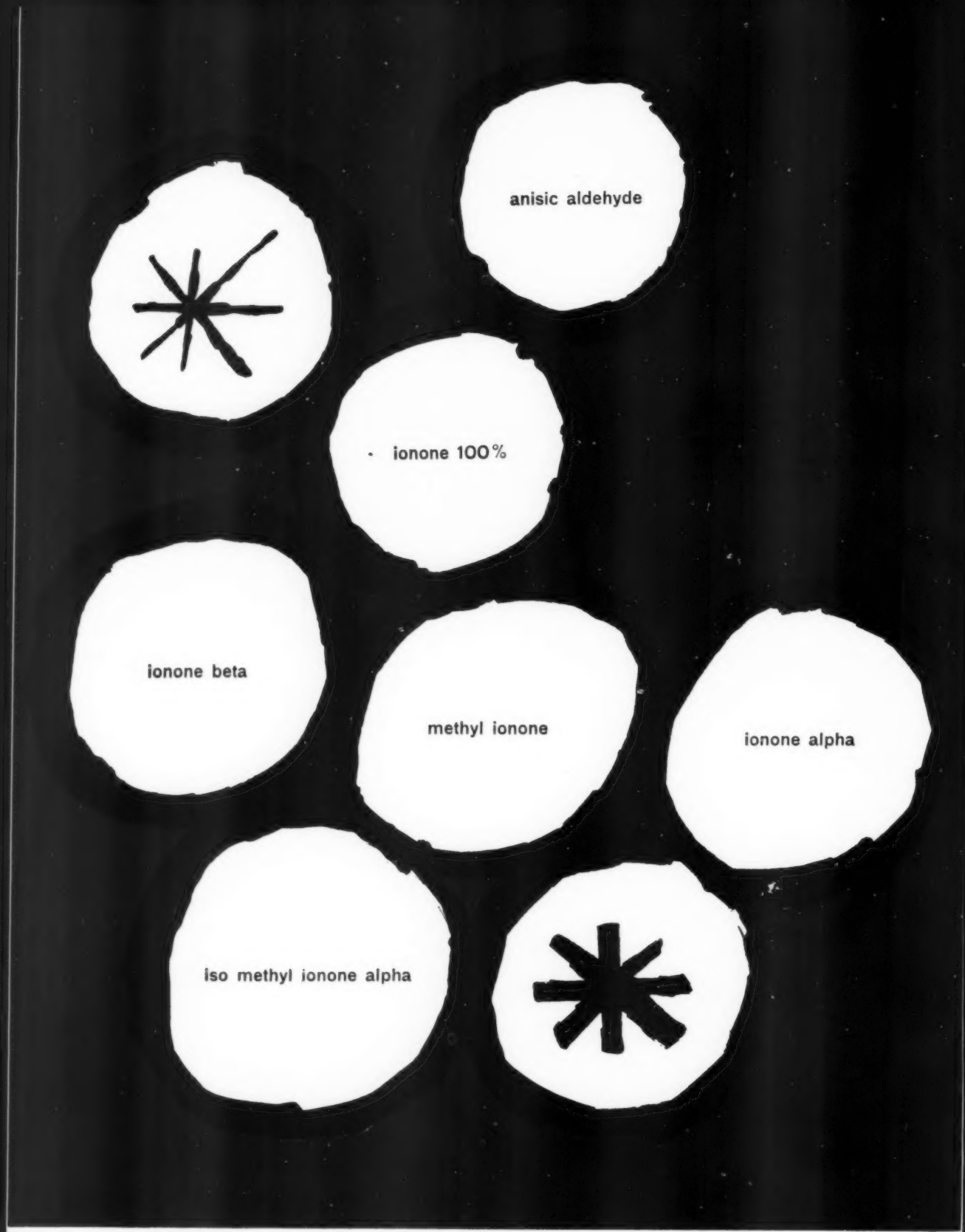

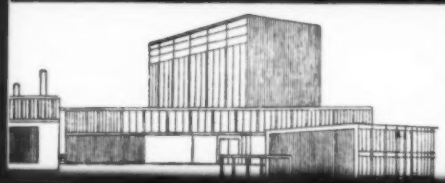

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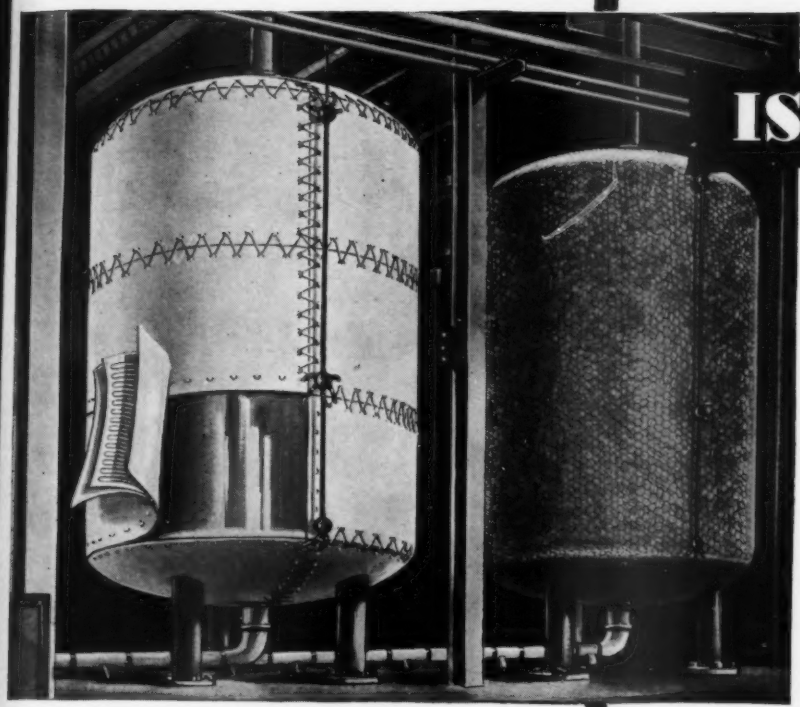

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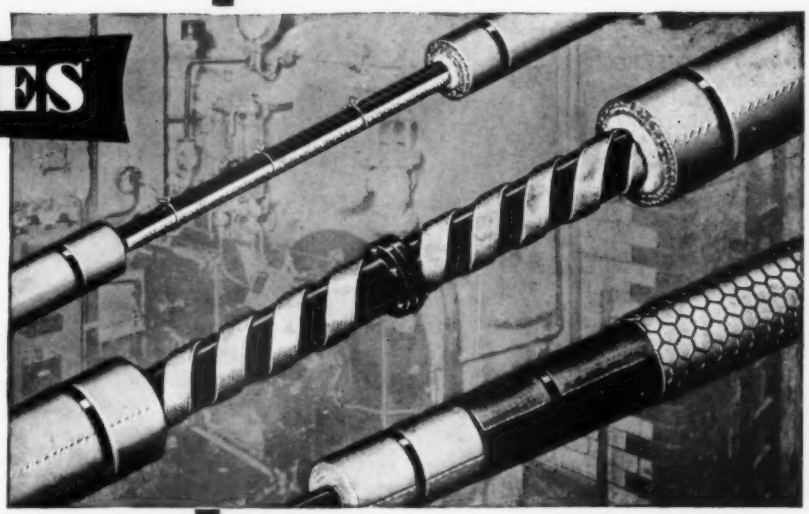

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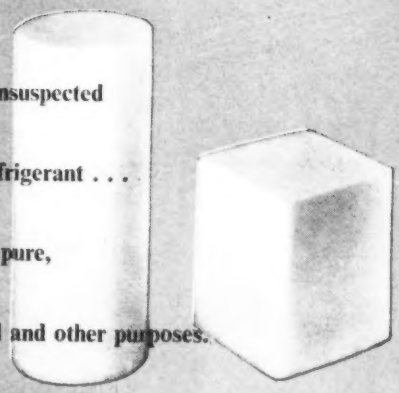

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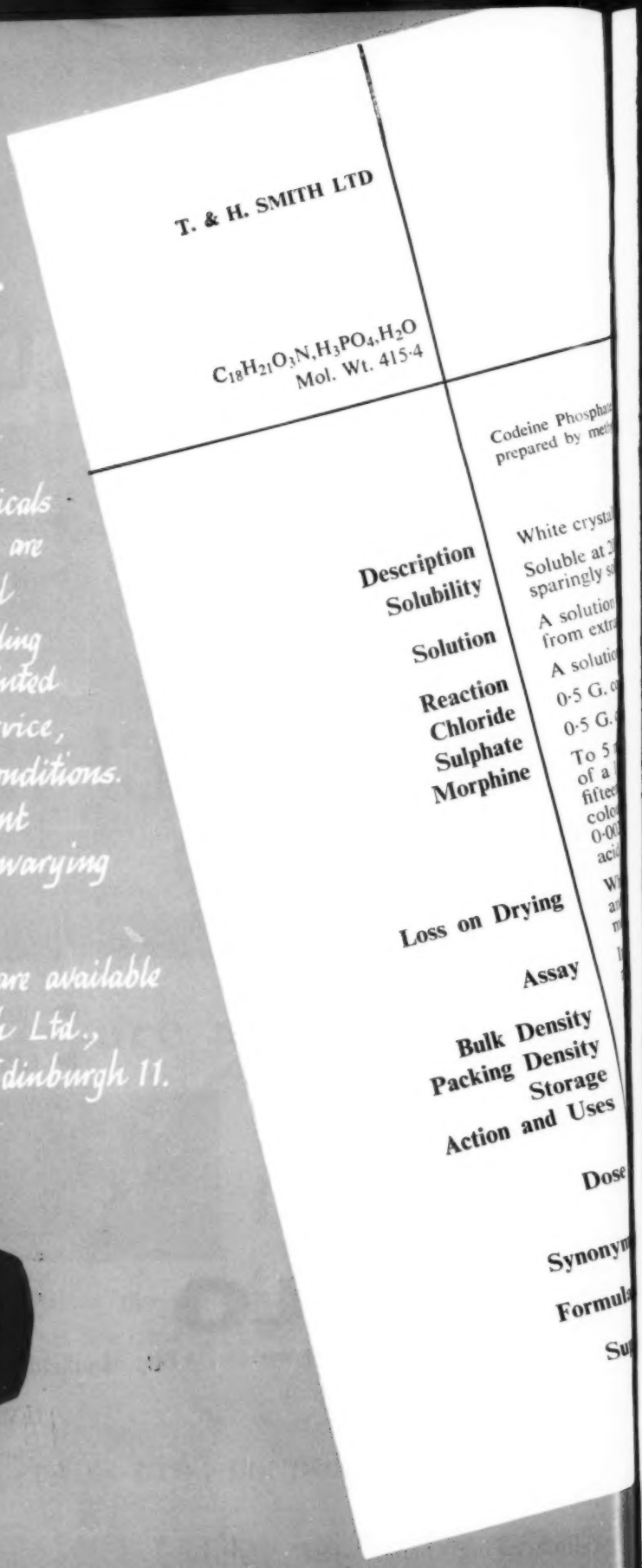

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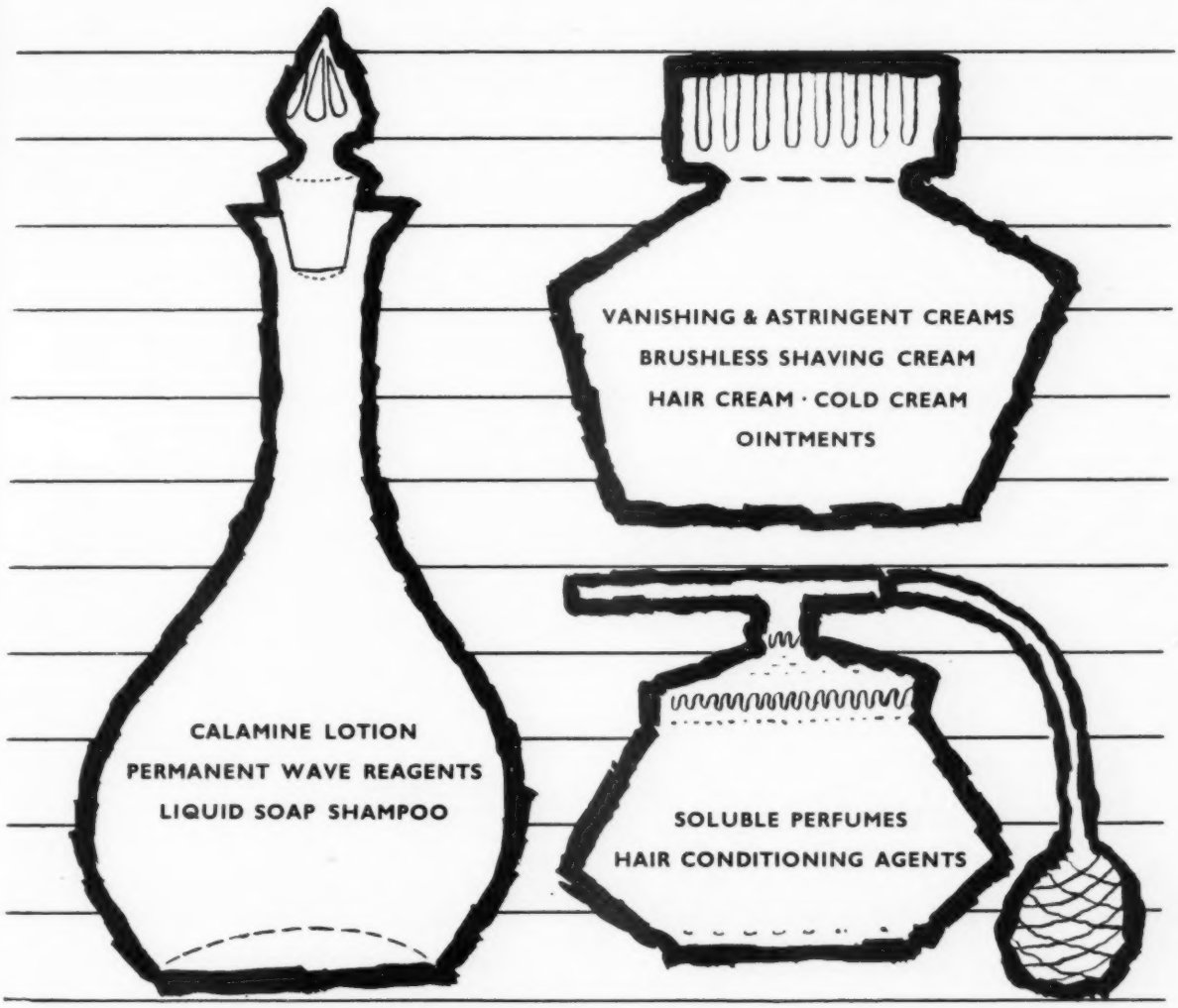

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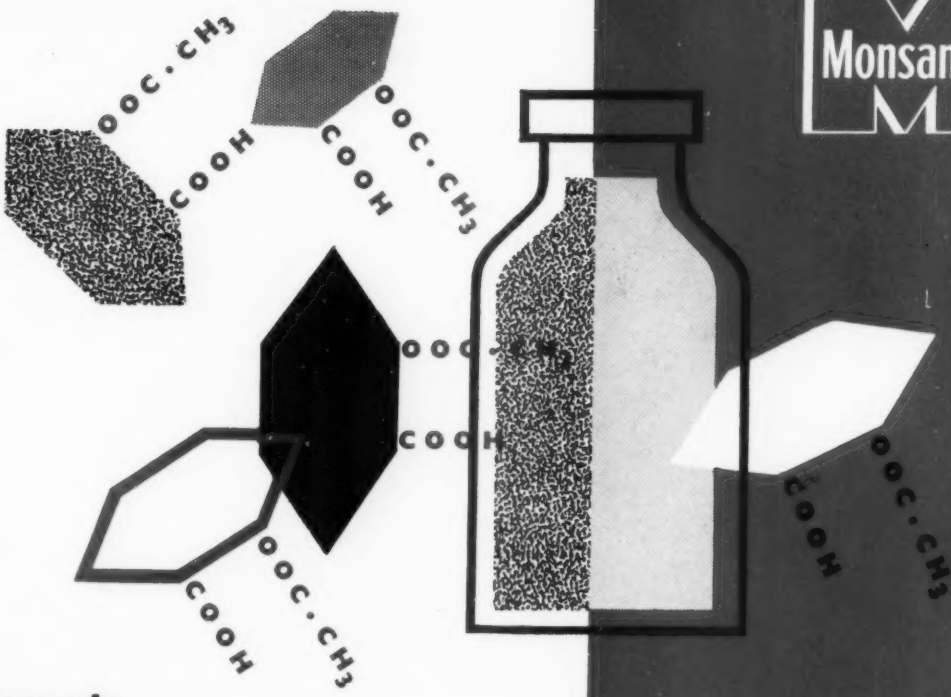

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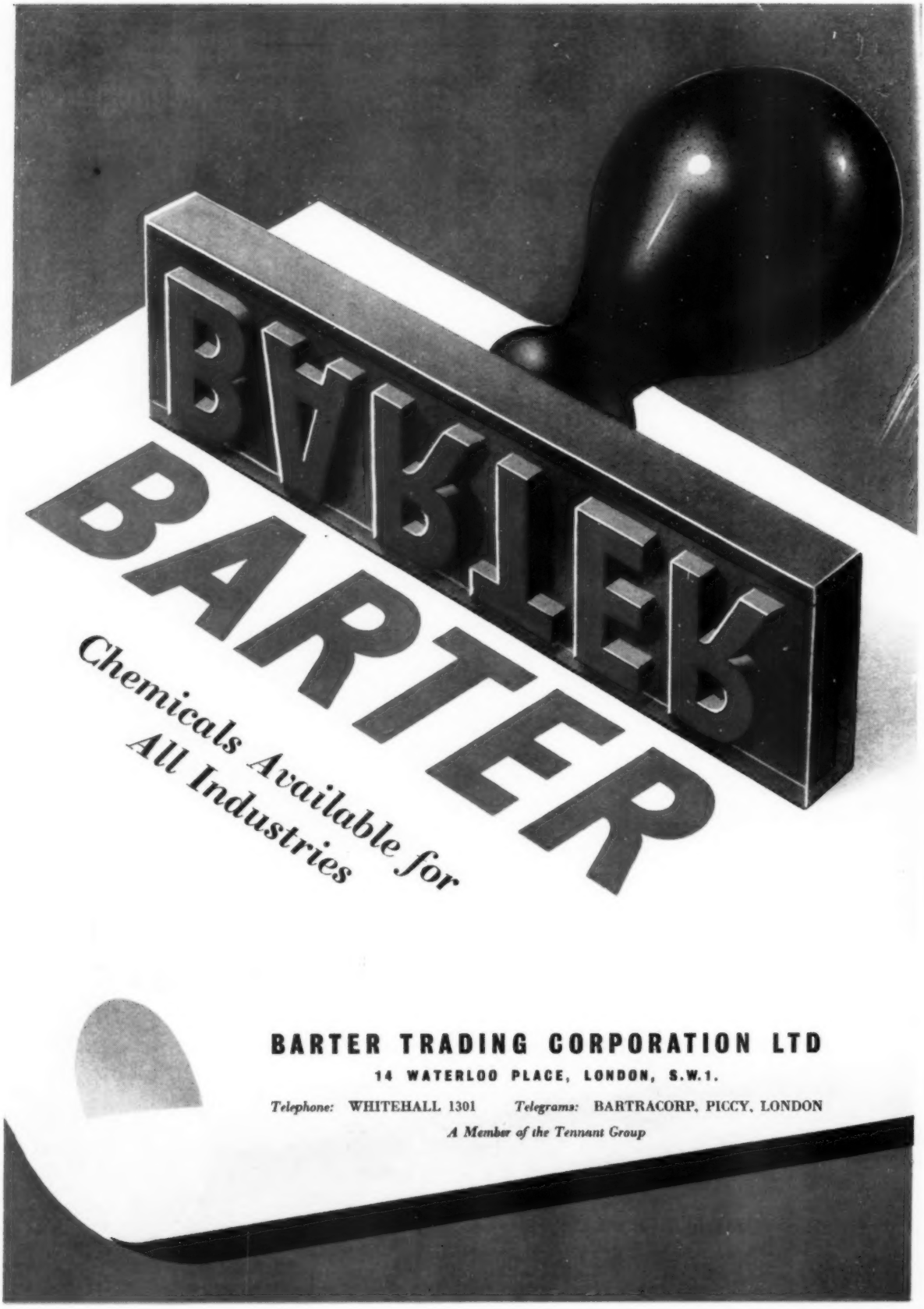
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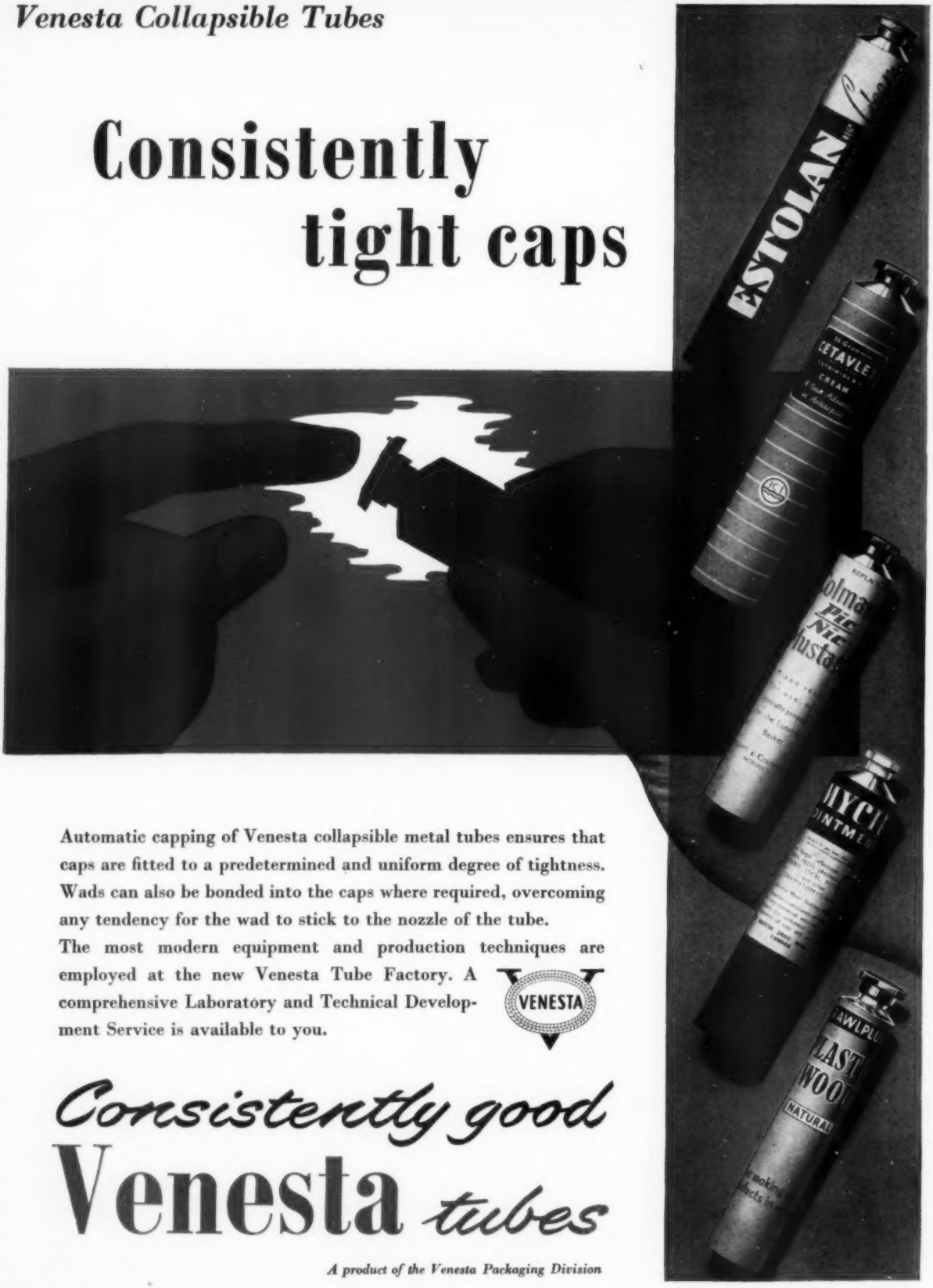

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MANUFACTURING CHEMIST
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Vol. XXIX, No. 6 — JUNE, 1958

Contents

Topics and Comments: 225
An overlord for science?; Struggling old lady; War on the killers; Matching pack to product; Work study in small firms; The Crop Protection Exhibition; New thinking at the D.S.I.R; Malaria in N.W.1.; Churchill College.

Nitrofurans and Pharmaceuticals; Smith Kline and French Laboratories' Tonbridge Factory 229

Improvement of Soap with Ethylene Oxide Condensation Products 233
By Dr. Hans E. Tschakert

Nonionic Surface-Active Agents—2. Industrial Applications 237
By Leon Raphael, M.SC., F.R.I.C.

Drug Houses of Australia — Link-up with American Cyanamid 239

Britain's Biggest Display of Chemical Plant, Equipment and Services 240

Progress Reports:

Therapeutics 249
By S. J. Hopkins, F.P.S.

Fertilisers and Plant Nutrients 252
By D. P. Hopkins, B.SC., F.R.I.C.

Mechanical Aids to Productivity 257

REGULAR FEATURES: PLANT AND EQUIPMENT 255 • BOOK REVIEWS 256 • NOTES AND NOTIONS 258 NEWS 259 • PEOPLE 261 • CHEMICAL MARKET 263 • NEWS FROM ABROAD 264 • NEW PRODUCTS 265 PACKAGING 266 • NEW PATENTS 267 • NEW COMPANIES 267 • TRADE MARKS 268 • SIXTY YEARS AGO 268

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TOPICS AND COMMENTS

An overlord for science?

At a time when the State is inexorably assuming more and more control of our activities—a process which we may deplore but cannot halt, since it is the price of modern civilisation—it must be admitted that State direction of our scientific effort is haphazard and in many cases feeble. In the fundamental field of education direction is uneasily shared between the Minister of Education and the University Grants Committee, a committee of the Treasury. The Ministry of Labour is also to some extent involved. State encouragement and support of research is extended through a bewildering variety of Government agencies—the D.S.I.R. which comes under the Lord President of the Council, the National Research Development Corporation which comes under the Board of Trade, the Royal Aircraft Establishment which comes under the Ministry of Supply and the Air Ministry, the Veterinary Research Station which comes under the Ministry of Agriculture, the Agricultural Research Council which comes under the Lord President, and so on.

This lack of central control and direction was strongly criticised by Sir Hugh Beaver in his presidential address to the Institution of Chemical Engineers. It seemed to him, as it will seem to many, an extraordinarily casual way of organising our scientific effort in a world which is being increasingly dominated by American and Russian science and technology. In the field of education the vital and unsolved problem is our lack of science teachers. The U.S.S.R. has about 250,000 science and mathematics teachers, about 1·3 per 1,000 of population; we have not much more than one-third of this number. The result is that the Russians are producing proportionally two or three times more engineers than we are. Even if we fulfil the Government's aim of doubling our annual output of scientists and engineers by 1970—which would be a near miracle—we must still, in Sir Hugh Beaver's opinion, expect to be short of scientific manpower for the next 20 years. This is a depressing prospect in the face of the Sputniks.

It must seem to many that the only way of bringing order out of the present chaos is to appoint a Minister of Science with overriding powers such as are exercised by the Minister of Defence. We would like to see more encouragement given to research-minded firms in the form perhaps of tax concessions.

We British are supposed to be a commercially minded people, but it is truly astonishing how casual we are in our attitude to science and technology, the encouragement of which, as everyone knows, is the key to our continued prosperity.

Struggling old lady

What is the precise standing of the British Pharmacopœia in this Welfare State? It is certain that its former usefulness as a valuable collection of standards has diminished. Recognising the enormous labour that has been involved in the preparation of the latest edition, the question must be asked: for whose benefit?

Some satisfaction will be felt by members of the committees who can at last see the fruits of their efforts. But their satisfaction is short-lived. In common with painters of bridges and housewives in their common round, they must now begin the cycle of gestation that will bring forth another edition in the short space of five years.

At one time, the letters B.P. on a label were a guarantee of quality of chemicals for laboratory workers, although that was not perhaps their intended use. With the extending manufacture of analytically pure branded materials, the letters have lost their significance in this field.

Doctors, apothecaries, pharmacists, dispensers and druggists also found the older editions of the B.P. most useful, indeed, if one may use the word in this context, indispensable. Today most prescriptions are made to the National Formulary directions. And we can judge from questions asked in the House of Commons from time to time, that doctors otherwise prescribe many medicinal substances not obtainable except as proprietary packs. Some hospitals, like St. Thomas's issue their own pharmacopœias.

Students will find much additional information concerning the materials listed in the B.P. in such publications as the Codex, Martindale's Extra Pharmacopœia, New and Non-Official Remedies and many other books.

Therein may be found the present state of knowledge concerning the mode of action of drugs, results of overdosage, cases of poisoning and the treatment to be given.

It used to be true that candidates for the Fellowship examination of the Royal Institute of Chemistry were expected to know the B.P. inside out. In a training course which extends over many years, which edition does one use as a textbook? The next one?

It is certain that all the people mentioned will be displeased with the arrival of a new edition B.P. Checking over the additions and deletions is a nuisance; amending labels is much worse.

Some amusement was afforded in comparing older editions of the B.P. to watch the changing fashions in medicine: one time, substances deriving from animal origins were deleted in favour of those of vegetable extraction: another time, the changes were in the opposite direction. As the B.P. grows

the changes become more and more difficult to cope with.

A correspondent of the *Pharmaceutical Journal* describes the B.P. as a pathetic old lady struggling breathlessly to keep abreast of the manufacturing houses.

He suggests that she should be allowed to retire gracefully. Perhaps to the museum of the Pharmaceutical Society.

War on the killers

VACCINE research is thought to be the best hope of countering virus diseases, including the common cold, by American pharmaceutical chemists. T. G. Klumpp and C. M. Suter of Winthrop Laboratories expect to see vaccines make headway against measles, mumps, infective hepatitis, virus encephalitis and colds in the near future. As for the Salk vaccine, they anticipate that it will one day be superseded by a live virus vaccine which will give longer immunity. They regard as surprising the lack of interest in the invention of a vaccine for Asian flu which is now being produced in large quantities. Certainly it is odd that in this country, where flu is much more disastrous than poliomyelitis, Salk vaccine has aroused vastly more interest (and Parliamentary fury) than Asian flu vaccine.

Giving their views on other future prospects in drugs and pharmaceuticals in *Industrial and Engineering Chemistry*, Klumpp and Suter concede that after the brilliant achievements of the past half century (vitamins, sulphonamides, penicillin antimalarials and so on) future harvests will be harder to win. The big problems are arteriosclerosis, cancer, virus diseases and mental illness.

The underlying metabolic or endocrine disturbances that permit arteriosclerosis to develop are not clearly defined. Not until the precise order of progression of the physico-chemical changes of arteriosclerosis are understood will chemists and biologists be able to develop agents to combat them.

Because no one knows what it is that permits a cell or cells of the body to break loose in a wild orgy of unbridled multiplication, cancer research is still a hit or miss affair with hundreds of thousands of compounds being tested for their possible effects on the various forms of cancer. The nitrogen mustards have some retarding effect on leukaemia and related blood disorders but they are unreliable, highly toxic and upsetting to the patient. Cancer research is indeed like looking for a needle in a haystack.

No fewer than nine million people in the U.S. are said to suffer from some form of mental disturbance. Within the last three years hope has lit a dark horizon in the form of thorazine and rauwolfia. Now a whole series of new compounds for aiding the psychiatrist in his treatment of the mentally sick are being developed.

Matching pack to product

THE introduction by Fisons of their new *Kil* insecticide in an aerosol pack is a textbook example of a product matching its pack perfectly. Apart from the convenience of being able to apply the insecticide direct—without diluting it and using a syringe—the extremely fine aerosol helps to make the product more effective since, of course, more of the foliage is wetted and more insects are attacked. Also, if the aerosol is used correctly—in one second bursts—it should prove reasonably economical. Unfortunately many people are heavy-handed with these packs and soon use up the contents, thus forming the view that they have not had value for money. It should be possible to overcome this idea as people become more used to aerosols and, it is to be hoped, the price is brought down.

Undoubtedly aerosols are revolutionising packaging and, indeed, are causing manufacturers to reformulate their products to suit this method of dispensing. To assist this trend the American Can Co. has set its research laboratory to work on the reformulation of honey, jams, jellies and spreads for aerosol packing. Provided all concerned continue to demonstrate the genuine functional attributes of aerosols as distinct from their novelty appeal, the industry should go far. An example of novelty as opposed to utility is the latest American toothpaste gimmick—toothpaste in an aerosol can. In fact it is more a pressure pack than an aerosol in that the propellant gas does not enter into the composition of the product as it is expelled, in the same way as it does with shave creams, mists, sprays and so on. The propellant used for toothpaste is nitrogen, which provides sufficient pressure to expel the product without altering it physically or chemically. But what is the point of this pack, besides novelty? We would have thought the collapsible tube the perfect pack for toothpaste; it is cheap, it allows the contents to be dispensed accurately and deposited right on the brush, it is completely safe (pressure packs can blow up), and it takes up far less room in the usually overcrowded bathroom cabinet or travelling holdall than the standard aerosol can. Frankly the point of it all escapes us, especially as there are so many other products so much more suited to pressure packing still waiting for attention.

Work study in small firms

NEW methods are never universally welcomed, indeed they sometimes provoke hostility. Thus the idea of work study was received with suspicion by managements and workers alike, the underlying fear being that it would show up inefficiency rather than improve techniques and skills. In the chemical industry this opposition has largely been removed by the enthusiasm with which the Association of British Chemical Manufacturers has sponsored work study. They have organised conferences and dis-

cussions and issued three publications on the subject. Today they claim that about 80% of the people working in the industry belong to firms who are applying work study.

In spite of this achievement there are still many small firms who do not use work study, either because they persist in remaining ignorant of it or because they think they are not large enough to apply it. The best answer to these reluctant firms is to demonstrate how work study has in fact helped small firms. Accordingly the A.B.C.M. has published a well-printed and illustrated book giving case histories from smaller firms and individual plants in the chemical industry.

It describes 21 examples of work study in a variety of operations. The savings effected range from £200 per year in the case of a small materials handling problem to about £10,000 per year in a plant maintenance operation.

The first of the three sections explains how, in chemical process work, costs can be reduced by increased plant output, reduced labour requirements, improved plant utilisation and layout. The second section deals with such operations as filling, packaging and materials handling. The third section describes incentive schemes based on work measurement whereby increases in productivity can be achieved either by reductions in labour force or by increased output.

These case histories should convince small chemical firms that work study should be applied to their own business. The booklet costs 4s. post free and it should be ordered (with cash) from the A.B.C.M., 86 Strand, London, W.C.2.

The Crop Protection Exhibition

IF THE purpose of a specialised exhibition is to attract specialists then the Crop Protection and Pest Control Exhibition certainly fulfilled its purpose. The first show of its kind, it was organised by our contemporary *World Crops* and held for four days last month at the Royal Horticultural Society's New Hall, Westminster. More than 50 exhibitors, many of them chemical firms, showed a great variety of materials and machinery for protecting crops and destroying pests. From the first day substantial orders were placed, a fact clearly indicating the quality of the visitors. Many came from abroad to see the show; one exhibitor reported enquiries from eight different nationalities in one day.

The Exhibition was officially opened by the Rt. Hon. Tom Williams, M.P., probably the most popular Minister of Agriculture we have had for a generation and certainly the most enduring—he was Minister for six years. Mr. Williams drew the picture clearly and directly: "The 2,700 million world population of today may become 4,000 million before the end of this century, so we shall need to win both the battle of scientific food production and its protection and conservation if the people are to be reasonably fed." He went on to praise the work of chemists and other scientists in devising new insecticides, verminicides and weed-killers and new methods of applying them. "It seems pretty obvious," said Mr. Williams, "that there is no form of investment in agriculture which will give such good returns as expenditure on the control of pests."

The interest aroused by the Exhibition certainly encouraged the sponsors and the participants. Already enquiries are being received as to the date of the next one. Whether it will be an annual or biennial event has not yet been decided. Certainly when the plans for the next show have been settled manufacturers of pest control chemicals should lose no time in booking space, for the Exhibition unquestionably fills a gap and fulfils a more worthwhile purpose than many other exhibitions which merely duplicate work which is already being done adequately, to the confusion of the public and the embarrassment of exhibitors.

New thinking at the D.S.I.R.

THE Department of Scientific and Industrial Research is in the process of rethinking its purpose and functions in the conditions of today, conditions which are vastly different from those obtaining when the Department was set up 42 years ago. What part should it play in the conduct of pure research? It is reaffirmed that the universities should continue to be the main centres of pure research, and in 1956-57 the D.S.I.R. recommended 115 grants for university research projects totalling £836,000 in value, compared with 47 totalling £400,000 in the previous year. This support must be still further extended, it is stated.

What part should D.S.I.R. stations play in research of direct application to industry? The scope of this work is being reviewed, but this will take some time. There is a large and growing field of activity in which the Government has a direct interest and special responsibility and which is appropriate to the programme of a national research establishment. But if the D.S.I.R. is to take on new responsibilities it must shed some of its present load. Reorganisation is already under way. Some of the Forest Products Research Laboratory's work is to be taken over by the Timber Development Association. The Fuel Research Station will be closed next year and such of its work as is to be continued will be transferred to a new station at Stevenage for fuel and process research. It is proposed further that the Agricultural Research Council should take over the Food Investigation Organisation's Ditton Laboratory and Low Temperature Research Station. Committees are now reviewing the functions of three other D.S.I.R. stations—the N.P.L., the Chemical Research Laboratory and the Mechanical Engineering Research Laboratory. Within the next year or so the fruits of this reorganisation will be apparent.

But the question is: will the streamlined and reshaped D.S.I.R. have enough funds for its work in the new conditions of the future? Currently it has less than £10 million a year to spend. In contrast those industries that might be expected to benefit from its work (*i.e.* those that do not benefit directly from defence research) produce goods and services worth nearly £10,000 million a year, more than half the gross national product of Great Britain. This comparison renders further comment almost superfluous. If the D.S.I.R. succeeds in adapting itself to fulfil the research needs of the future it is only plain commonsense that it should get the wherewithal to do its work.

Malaria in N.W.1

HENRY WELLCOME, founder of Burroughs Wellcome and Co., was a great friend of the American explorer Stanley. Through this friendship Wellcome became intensely interested in tropical diseases. An enduring monument of this interest is the famous Wellcome Museum of Medical Science in the Wellcome building in Euston Road, London, N.W.1. This is more than a museum. It is a centre of medical teaching, with especial emphasis on tropical diseases. Each year it is visited by upwards of ten thousand doctors, medical missionaries and students, many of whom spend weeks there, steadily working their way around from section to section and acquiring in the process the most up-to-date information on the nature and treatment of communicable diseases.

The aim of the Museum is to mirror the constantly changing face of medical science. Thus, when it was started in 1914 the existence of virus diseases was only just beginning to be appreciated; today no fewer than 63 panels are required for this important group. Until recently much emphasis was laid on syphilis and the killing epidemic diseases such as plague and cholera. Two years ago the panels devoted to syphilis were reduced to four, while plague was reduced from seven to three panels. A full-scale review of malaria occupying 45 panels is now on display; it is the most comprehensive and up-to-date display of its kind in the world. It is to be hoped that current control and eradication schemes for malaria enable this display to be reduced in the next few years.

As some diseases are overcome others acquire added importance, particularly in the tropics. Thus diseases of temperate climates like tuberculosis, bronchitis and malaria have become problems for tropical peoples.

Many of the drugs mentioned in accounts of treatment are on display. This is of special value to the practitioner who is about to start a career overseas, since it enables him to become acquainted with both the names and the appearance of the drugs he will later prescribe. In the hookworm section a display of anthelmintics in capsule form shows how closely one drug may resemble another used for treatment of the same condition. Naturally, drugs other than Wellcome's are shown.

Recently we had the pleasure of inspecting the Museum now that a number of changes in its contents have been made. It is certainly a most impressive and useful contribution to medical teaching and the British pharmaceutical industry may take pride in the fact that it is supported entirely by one of their number.

Churchill College

IT IS a sign of the times and every bit in keeping with his support of science, especially during the war, that the memorial Sir Winston Churchill wishes to leave to posterity is a new college of technology at Cambridge. Last month he launched the scheme by contributing £25,000 towards it from his 80th Birthday Fund. The total cost of the college, to be known as Churchill College, will be £3,450,000. Sir Winston has himself addressed an appeal for contributions to industrialists, asking them to "contribute with enthusiasm and not with caution, remembering that whether or not your company will gain directly from an increased output of technologists with such high training, it will assuredly do so indirectly; for our country stands in need of them as its first and principal line of defence for future years."

There is every prospect of this eloquent appeal being successful. Already a 40-acre site has been earmarked at Cambridge. That University is particularly suited to accommodate the new College for it has in recent years enlarged its scientific and technological activities and has created strong and growing schools of metallurgy and chemical engineering.

At least 70% of the members of Churchill College will be scientists and technologists. No more than 30% of students of other disciplines will be admitted. Another unusual feature is that there will be a ratio of one to two of post-graduate to undergraduate members. This big proportion of post-graduates means that suitable people in industry who have never had the chance of university training will be able to enrol as students. This is a wise and imaginative decision for there must be many brilliant people in industry who would enormously benefit themselves and the country if they had the opportunity of going to a university. Such students will be drawn from overseas English-speaking countries as well as from Great Britain. Churchill College could well become the training ground for a large *corps d'élite* which could exert a great influence on technological development throughout the world.

Already Sir Winston Churchill's appeal has brought a promise of £50,000 from the Gulbenkian Foundation in Lisbon. In the U.S. support for the appeal will be led by Mr. Carl Gilbert, President of the Gillette Co. It is to be hoped that British industry will support it wholeheartedly.

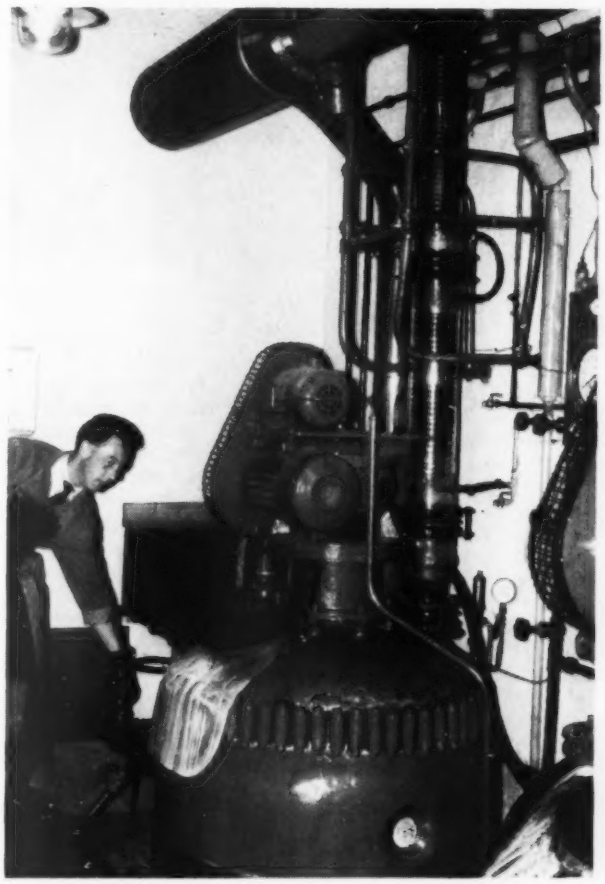
Nitrofurans and Pharmaceuticals

Smith Kline and French Laboratories' Tonbridge Factory

Built on the site of an old gunpowder mill near Tonbridge, Kent, the Smith Kline and French fine chemical factory now produces some 14 drugs for pharmaceuticals and nearly all the nitrofurans used in this country. The type of chemical work carried out in the versatile plant installed is described here.

LAST year over 90 per cent. of all nitrofurazone containing preparations sold in this country contained nitrofurazone manufactured by Smith Kline and French Laboratories Ltd. in their fine chemical factory at Tonbridge. Most of these preparations are animal feedstuffs compounded and distributed by various large organisations that cater for the agricultural market. Nitrofurazone is used as a preventive measure against avian coccidiosis and for the control of necrotic enteritis in pigs.

A very large number of other nitrofurans have been developed in laboratories, especially in the U.S.A., and some have proved of wide use. Since the Tonbridge factory began making nitrofurazone in 1951 it has gone into production on new nitrofurans at the rate of one every two years. The second was *Furazolidone*, which made its debut as the first effective agent for controlling fowl typhoid; then came *Furadantin* (nitrofurantoin), an interesting newcomer to the treatment of human urinary tract infections; and recently *Furamazone* (nifuraldezone), pilot batches of which, produced at Tonbridge, are at present being used for clinical trials.



Preparing a reactor for nitrofurazone production.

Smith Kline and French took over the Tonbridge factory just over a year ago from Menley and James Ltd. Up to that time the veterinary nitrofuran products were all marketed under the name of A. J. White Ltd. Their manufacture—and development, for the Tonbridge factory is not just a passive manufacturing plant—occupies about half of the total 20,000 sq. ft. of production area at present standing in the 11-acre site. The remaining half is devoted to the manufacture of drugs for pharmaceutical products.

The works are run as a service unit to the company's main pharmaceutical factory in London, and the two units share such services as analytical control, raw material purchasing and accounting.

Tonbridge is organised with local sections responsible for production, development and maintenance, most of the design and installation work being handled by the factory staff. From its original small beginnings the factory has progressed steadily until today some 14 fine chemicals are produced, involving more than 50 different chemical stages.

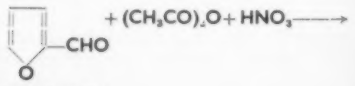
As with most fine chemical manufacture the emphasis on the processing side is twofold. First, the plant and services must be versatile to allow for the rapid production of new compounds and to cater for new developments worked out on existing processes. Second, owing to the multiplicity of operations, this type of processing calls for a high degree of skill on the part of the operators. The operating staff has been recruited locally in this rural area, and includes many men without previous chemical experience who, after training and some years of experience, nevertheless form an excellent team.

Chemical manufacture is centred in two main buildings, one manufacturing mainly drugs required for

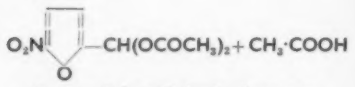
the company's pharmaceutical products, and the other producing bulk nitrofurans for the veterinary side of the business.

Nitrofuran production

The basic ingredient of all nitrofurans is 5-nitro-2-furaldehyde diacetate, and this is formed by the nitration of 2-furaldehyde in the presence of acetic anhydride.



2-furaldehyde



5-nitro-2-furaldehyde diacetate

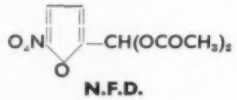
The nitration is carried out in 100-gal. stainless steel nitrators fitted with cooling coils through which refrigerated water circulates. The water is stored in a large lagged tank in the building, and cooled by a multicoil Freon evaporator working with a suitable compressor and condenser. The nitrators are fitted with high-speed stainless steel impellors, and temperatures are measured by a fast-acting potentiometric temperature recorder. The complete ventilation system in this building is fabricated from PVC.

Acetic anhydride from a 2,000-gal. aluminium tank is automatically measured to a 50-gal. stainless steel measuring head-tank by vacuum, and discharged by gravity into one of the nitrators. Nitric acid also is measured into a head-tank by suction and run into the anhydride, using the refrigerated water to maintain the temperature below 25° C. The furfuraldehyde is delivered in 50-gal. drums and a measured quantity is transferred to a stainless steel head-tank and then run slowly, by gravity, into the nitrator. During this nitration step, approximately 60,000 B.Th.U.'s are liberated in about 20 min. for every 30 gal. of reaction mixture. After further treatment the 5-nitro-2-furaldehyde diacetate gradually crystallises out as sugar-like particles. The slurry is pumped with a stainless steel centrifugal pump to a 36-in. rubber-lined centrifuge, the mother liquor is discarded and the N.F.D., after washing with water, is dried at atmospheric pressure before use.

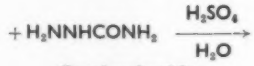
The material thus obtained is very pure and is used for veterinary products without re-working. If required for the preparation of drugs for human use, such as Furadantin, it is recrystallised from iso-propyl alcohol. The principal veterinary products made from N.F.D. are Nitrofurazone and Furazolidone, both of which are extremely effective in a wide range of diseases of poultry and animals.

One of the general manufacturing areas at Tonbridge.

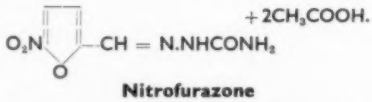
Nitrofurazone is formed by the reaction between semicarbazide, also made at these works, and N.F.D. in the presence of sulphuric acid and water:



N.F.D.



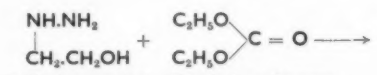
Semicarbazide



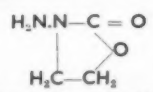
Nitrofurazone

This reaction is carried out in jacketed 150-gal. glass-lined mild steel vessels fitted with impeller-type agitators. The reactants are charged and heated while being stirred at 90° C. for 2 hr. During this period the nitrofurazone begins to precipitate. The mixture is cooled to 20° C. and the slurry runs by gravity into a 36-in. rubber-lined centrifuge, the product being washed with water and dried in a batch tray dryer. The semicarbazide required for this reaction is manufactured in an adjacent 300-gal. stainless steel reactor.

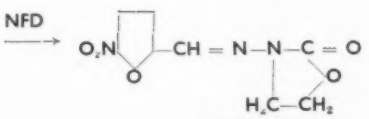
Furazolidone also is produced in the same equipment. This involves the reaction of N.F.D. with 3-amino-2-oxazolidone, prepared from 2-hydroxy-ethyl hydrazine and diethyl carbonate in the presence of an alkali metal catalyst:



2-Hydroxyethyl hydrazine **Diethyl carbonate**



3-Amino-2-oxazolidone



Furazolidone

Here again the product is a fine yellow powder, which is centrifuged off and dried in batch tray dryers.

The plant already installed has a weekly capacity of over 5,000 lb. of either of these two nitrofurans. Other nitrofurans in large-scale production are Furadantin, for which 2-amino hydantoin is made, and Furamazone, where the intermediate made is semioxamazone.

The compounding of Nitrofura-

zone and Furazolidone into the various poultry and animal feed supplements is carried out in a separate building, and a Gardiner ribbon-type batch mixer is employed for this purpose. Packaging of the mixes is done at Tonbridge, while the soluble forms of presentation are made up and packaged in Smith Kline and French Laboratories' main factory in London.

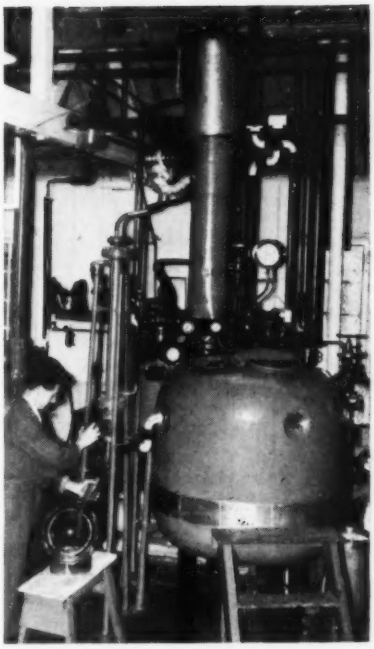
Pharmaceutical production

In the other main plant building the basic drugs for pharmaceutical products such as *Benzedrine*, *Dexedrine* and the *Benzedrex* Inhaler are made.

Services available here include steam at various pressures from two oil-fired boilers with a total steaming capacity of 8,000 lb./hr., hot water, mains water, bore-hole water and circulating hot oil for heating purposes. The oil for this last service is circulated in a ring main at high level and is heated by four batteries of immersion heaters, thermostatically controlled, with a total loading of 87 Kw. Circulation is achieved with two centrifugal pumps and the piping is so arranged that two batteries of heaters can be by-passed when the heating requirements are small.

The equipment employing these services comprises jacketed vessels from 50 to 300 gal. capacity in a variety of constructional materials including glass-lined cast iron, stainless steel, mild steel, monel metal and silver. Some unjacketed vessels are heated by built-on electric heating mantles which have been mainly fabricated on the site. A typical example of the loading used in this latter application is furnished by a 50-gal. stainless steel still with an 8 Kw. heater, giving operating temperatures in excess of 250° C. Most vessels are equipped with condensers, some of which can be cooled with both hot and cold water through steam/water mixers. Two sources of vacuum are available from twin ring mains serviced by two Worthington - Simpson vacuum pumps capable of giving an absolute pressure of 20 mm. of mercury. When a process requires a higher vacuum, an Edwards SC. 450 pump is employed. Filtration facilities are provided by a 36 in. ebonite-lined, two-speed Broadbent centrifuge and materials are dried in Mitchell dryers of the steam-heated, forced circulation type.

General ventilation of the building is achieved by blowers, hot or cold, at ground level, and suction fans at high level. Local ventilation is provided by a system of aluminium ducting with inlets adjacent to vessels, connection to any source of fumes being then made with flexible ventilation hose. The suction fan for this system, in common with all the ventilation systems in the factory, must first be switched on before any electrical prime movers or heating equipment will operate. This ensures that no operator can start work without adequate ventilation in the works.



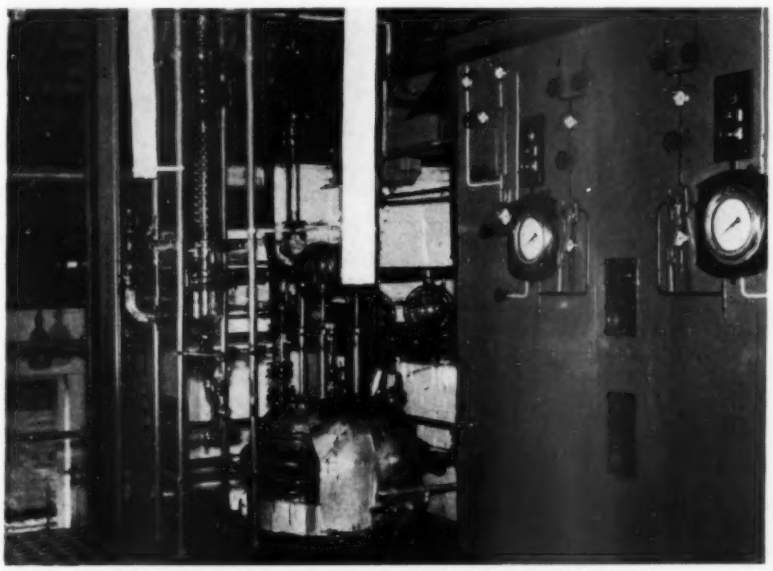
Hundred-gallon stainless steel fractional distillation unit.

In addition, this building houses a furnace heated by induction which operates in conjunction with a continuous glass still. The stainless steel furnace consists of a vaporiser and catalyst chamber or converter with various ancillary equipment, such as head tanks, flow meter, electrostatic precipitator and condenser. The temperatures of the vaporiser and converter are automatically controlled and the apparatus runs 24 hr. a day. The products of the reaction are continuously separated in the glass still.

The flexibility and variety of services and constructional materials of the plant make it possible to carry out a large number of different synthetic organic operations leading to the production of such intermediates as *r*-amphetamine, *d*-amphetamine, propyl hexedrine, hexamine mandelate, substituted butyl isoquinolines and diphenyl pyraline.

Development

The factory operates its own process development unit, comprising both laboratory and pilot plant facilities. This group is in



A reactor and control panel in the development unit.

close contact with the other research groups of the company, and is concerned with developing processes to plant scale, carrying out investigational work into current production problems, and with long-term process improvement. Two other important functions are the production of small batches of new drugs for clinical evaluation and the manufacture of chemicals involving very complicated synthesis.

All the services previously described are available in this unit and in addition a multistage steam/water high vacuum ejector is being installed. Jacketed, agitated vessels installed in the pilot plant include 25-gal. and 50-gal. glass-lined cast iron reactors, and a 50-gal. stainless steel vessel with an infinitely variable speed motor driving the stirrer. Controls to the vessels included in this equipment are located on diagrammatic panels, along with the various temperature and pressure indicators connected to the system. It is thus possible to have complete control and knowledge of reaction conditions at a central control point. All electrical equipment and wiring is flame-proof and the system of having a grouped motor control panel of non-flameproof equipment, situated in a non-hazardous area, has been adopted. This switch room is kept under a slight positive pressure of air by a small fan which is automatically switched on with the ventilation system. Portable refrigeration, vacuum and gas scrubbing units have been made up for coupling to any of the vessels needing these services.

Expansion

The size of the factory site allows for considerable expansion in the future, while the balanced nature of the variety of activities already carried on gives a good basis on which to expand. The new Welwyn Garden City factory for Smith Kline and French will allow a considerable expansion of the pharmaceutical business of the company, and the resultant increased demand for drugs can readily be met by the Tonbridge chemical works.

Formulation of Aerosol Cosmetics

THE cosmetics industry will have to pay increasing attention to aerosol packaging in order to meet the demands of the customers. This point was emphasised in a paper read by E. Obrocki at the annual meeting of Sepanas, the association of German manufacturers of detergents and perfumes, at Bad Dürkheim.

Experience with push-button dispensing in Europe has shown that on this side of the Atlantic aerosol packing will only be successful where it either opens the way for a new application or considerably improves the effect of an old one. When a substance is to be used in a "finger-tip" dispenser, its physical, chemical and physiological properties have to be studied very carefully, and in addition very often practical tests are necessary to find the best propellent, the optimum pressure, the right type of valve, the best solvent and the most suitable material for the container. Failures are often due to corrosion, sedimentation, choked valves, discoloration, inflammability or toxicity of the spray, viscosity changes or undesirable chemical reactions.

The pressure in the aerosol container varies with the temperature, but not with the quantity of the propellant. Gas and liquid are in equilibrium, and as long as some liquid remains in the container the pressure will remain constant. If the valve of a two-phase aerosol is opened, a homogeneous mixture of the dissolved substance and the liquefied gas will be dispensed. The necessary fine division of the substance is produced by the spontaneous evaporation of the liquefied gas. The size of the particles depends on the vapour pressure of the propellant and on the proportion between gas and substance. The higher the proportion of the gas and the higher the pressure, the greater the atomisation.

For surface aerosols the particles should be so big that they do not float in the air, but small enough to allow penetration into the surface to be treated (skin, hair, etc.). Three-phase aerosols do not produce such a fine spray as two-phase aerosols, but have the advantage of not causing a strong cooling of the atomised substance and the surface to be treated, a point of importance for certain cosmetic products.

For perfume aerosols in glass bottles the pressure should be kept below 1·8 atm. If the bottles are protected by a plastics coating, the pressure may be increased to 3 atm. One of the main problems is always the choice of the propellent. In America dichloro-difluoro methane (CCl_2F_2) sold as Freon 12, and dichloro-tetrafluoro ethane ($C_2Cl_2F_4$) sold as Freon 114, have proved to be very suitable for most purposes, because these substituted paraffins containing both chlorine and fluorine are extremely stable, have a low toxicity and a low boiling-point. The German chemical industry make similar products sold under the trade name of Frigen. For perfume aerosols Frigen 114 ($CF_2Cl—CF_2Cl$), is a very good propellent, and 35 parts of Frigen should be used for 20 parts of the alcoholic perfume solution. Frigen 11 ($CFCl_3$) must be avoided, because it produces hydrolysis and the hydrogen chloride evolved attacks the metal parts of the valve and destroys the perfume.

For body deodorants and particularly for those to be used for perspiring feet aerosol dispensing offers many advantages. An efficient foot deodorant consists of 0·5% scented oil, 1% of a germicide, 28·5% isopropyl alcohol and 70% Frigen R 11/12 (50/50).

Hair sprays show aerosol dispensing at its best. A good hair spray may contain 5% shellac, 0·5% plasticiser, 34·5% absolute alcohol and 60% Frigen R 11/12 (35/65), but shellac is being replaced more and more by polyvinyl pyrrolidone, made by high-pressure synthesis from formaldehyde and acetylene, which has the advantage of being soluble in water. It can therefore easily be removed from the hair.

On the other hand, it absorbs water from the air and becomes sticky, but this can be reduced by suitable additions.

Most perfume manufacturers have aerosol laboratories to test the suitability of their products for the new dispensing method. This is important, because manufacturers of cosmetics cannot hope to use their old preparations without adaptation, if they want to change over to aerosol packaging.—*Kosmetik*, 1957, **30**, (22), 663.

Improvement of Soap with Ethylene Oxide Condensation Products

By Dr. Hans E. Tschakert*

In this article the author describes tests which show how ethylene oxide condensation products can improve the quality of soap. In particular structure and homogeneity are improved, gloss and cold water lathering are enhanced and cracking and flaking are diminished.

DEFECTS which can arise in the manufacture of bar soaps, especially boiled and hot-stirred soaps, include embrittlement, scaling and loss of gloss. In several series of tests we established that a proportion of a suitable ethylene oxide condensation product can homogenise and improve the structure of the soap mass to such a degree that these defects generally no longer arise. The proportion of ethylene oxide derivative is usually between 2 and 5% (calculated on the fatty acid content). Our tests were performed with 3% of synthetic detergent (calculated on the soap mass). The changes that occurred after various periods of time as the result of incorporation of different syndets are illustrated by the tabulated data and by photographs.

Details of the composition of the soap base are not given because soaps made by reputable firms were used in all cases (fatty acid contents well over 80%).

Table I gives details of the changes in a toilet soap base with over 80% fatty acid content after storage for 1, 3, 6 and 18 months in a closed glass case standing in a dry room without direct exposure to light.

Photographic evidence of changes in soaps after storage

The first five photographs show the changes (darkening) of the soap base in comparison with samples containing various additives after 18 months:

* Chemische Werke Hüls A.G., in Marl, Germany.

All the additives included appreciably reduce the after-darkening of the treated soap bases.

Fig. B III/4 illustrates the favourable effect of alkyl ethoxylate on prepared soap bases (filled, protected against oxidation) even after six months.

Fig. G II/5 shows that luxury soaps, made with first-grade raw materials and containing also additives to guard against oxidative effects, do not darken so badly after incorporation of the above agents.

Edge transparency of the soaps

Black-and-white photography does not give a good impression of the differences in surface changes, *i.e.* colour changes towards yellow, violet or grey. Several photographs are therefore shown that bring out

Table 1. Evaluation of Various Soaps after Storage for Different Periods

No.	Additive	1 month	3 months	6 months	18 months
B I/1	Soap base	yellow tint	further yellowing; yellow spots	definite further intensification of yellow colour; starts to become rancid	yellows very badly, is rancid and exhibits yellow spots
B I/2	Oleyl alcohol ethoxylate	barely yellow	good gloss, much paler than 1	yellow tint, much paler than 1	paler and definitely more transparent than 1, is not rancid and is free from yellow spots; structure and gloss good
B I/3	Lauryl alcohol ethoxylate II	faint yellow tint	like 2 but rather deeper yellow	like 2	rather paler than 2, structure and gloss good
B I/4	Lauryl alcohol ethoxylate I	no change	like 2	like 2, rather less gloss	a shade paler than 2, structure and gloss good
B I/5	Alkyl phenol ethoxylate	yellow tint, slight cracking	paler than 2, faint yellow tint, slight cracking	paler than 2, slight flaking and cracking	paler than 2, slightly flaky, cracked
B I/6	Polyethylene oxide wax 6,000	flaky, paler than 2	paler than 2, flaky, poor structure	paler than 2, bad flaking	much paler than 2, bad flaking, hard structure, brittle, less glossy than 2
B I/7	Oleic acid diethanolamide	turns yellow	further yellowing, gloss and structure still good	still further yellowing, structure and gloss still good, no yellow spots	paler and more transparent than 1, moderately good structure, no brown spots, not rancid
B I/8	Lauric acid diethanolamide	turns yellow	further yellowing, structure moderately good	like 7	like 7
B I/9	Lauric acid monoethanolamide	faint yellow, slight cracking	faint yellow, slight cracking	faint yellow, slight cracking	faint yellow, paler than 2, but cracked
B I/10	Myristic acid monoethanolamide	like 9	like 9	rather paler than 2	paler than 2, edge transparency good, no brown spots, structure better than 2, good gloss
B I/11	Oleylamine ethoxylate	better than 2, but slight yellowing	slight yellowing	like 9	like 9, rather harder in structure than 9
B I/12	Laurylamine ethoxylate	slightly better than 11	resembles 11, but rather paler	resembles 11 but rather paler structure, more easily reacted	like 11, structure rather better than 11

In each of the ten photographs of soap samples, the specimens (A, B, C, D, etc.) should be read off from left to right.

Fig. B I/1.

(*a*) Soap base
(*b*) Soap base+oleyl alcohol ethoxylate
(*c*) Soap base+lauryl alcohol ethoxylate II
(*d*) Soap base+lauryl alcohol ethoxylate I

Fig. B I/3.

(*a*) Soap base
(*b*) Soap base+alkyl phenol ethoxylate
(*c*) Soap base+oleic acid diethanolamide
(*d*) Soap base+lauric acid diethanolamide
(*e*) Soap base + lauric acid monoethanolamide
(*f*) Soap base+myristic acid monoethanolamide

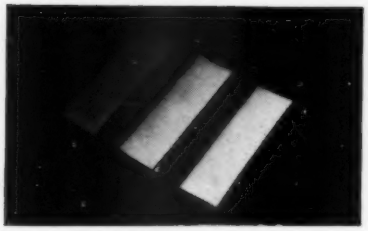


Fig. G II/5.

(*a*) Luxury soap base
(*b*) Luxury soap base+oleyl alcohol ethoxylate
(*c*) Luxury soap base+oleylamine ethoxylate

Fig. B I/2.

(*a*) Soap base
(*b*) Soap base+oleylamine ethoxylate
(*c*) Soap base+laurylamine ethoxylate
(*d*) Soap base+polyethylene wax 6,000

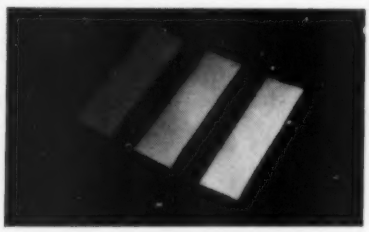


Fig. B III/4.

(*a*) Filled soap base
(*b*) Filled soap base +lauryl alcohol ethoxylate
(*c*) Filled soap base +laurylamine ethoxylate

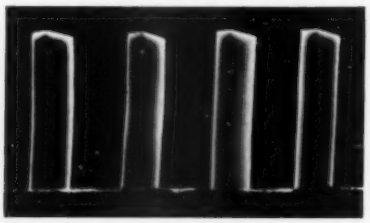


Fig. B I/6.

(*a*) Soap base
(*b*) Soap base+oleyl alcohol ethoxylate
(*c*) Soap base+lauryl alcohol ethocylate II
(*d*) Soap base+lauryl alcohol ethocylate I

the differences in edge transparency, *i.e.* the relative light transmissions, which in turn supply information about the soap structure (Figs. B 1/6, B 1/7, B 1/8).

Soaps containing fatty acid alkylolamides and (especially) alkyl phenol ethoxylates are all paler than the soap base.

At the same time, those containing fatty alcohol ethoxylates and aliphatic amine ethoxylates are still better.

Edge transparency of filled and milled toilet soaps

Fig. B 111/9, showing the edge transparency after six months' storage demonstrate the possibility of improvement of filled toilet soaps.

Edge transparency of selected luxury soaps

Photographic evidence of the improvement effected in the edge transparency of a luxury toilet soap is given in Fig. G 11/10. Here the yellowing (in comparison with that of the toilet soap base) was still conspicuous after 6 months but not as striking as that of the base alone.

Apart from the above series, we also tested others containing no additive for prevention of brown spots, etc., and containing other fillers; also other series made up from specially selected raw materials.

Although the tests of these series are not yet complete, we can already say that *improvements can always be effected* by incorporation of suitable *akyl ethoxylates and alkylamine ethoxylates* even with raw materials of the very highest quality. These improvements extend to:

soap structure
yellowing
surface gloss
edge transparency
perfume retention
reduction of rancidification
improvement of efficiency in presence of lime
improved behaviour during milling

Apart from differences detected by the naked eye, we also made observations on some physical properties of soaps blended with the syndets in question.

The differences in *loss of weight* after 1 and 18 months (to save space we omit details for the intermediate periods) show that, as was expected, all the soaps undergo a certain degree of drying.

Table 2 indicates that the additives suppress drying-out to a greater or lesser extent.

After storing for one month the more highly ethoxylated additives retard drying to a greater extent than those syndets prepared by condensation with less ethylene oxide.

After storage for 18 months the results are broadly similar but in all cases show an improvement over the untreated soap base. The aliphatic amine ethoxylates are the most effective, and the fatty alcohol ethoxylates take up an intermediate position.

Incorporation of fatty acid alkylolamides also hinders excessive drying out, although in the absence of other additives the soap structure is not improved.

No success has so far attended attempts to establish visible differences in rub resistance and swelling properties in water that could serve as a basis of comparison. The differences between the individual end values are so small that they lie substantially within the margin of error.

It was difficult to evaluate the numerous alkali determinations and to establish a definite trend, because of the slight differences in some cases in the change of free alkali

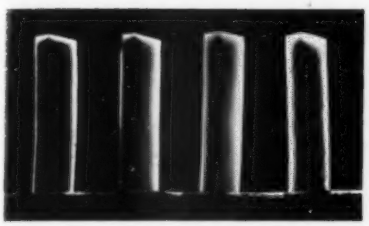


Fig. B I/7.

(*a*) Soap base
(*b*) Soap base+oleylamine ethoxylate
(*c*) Soap base+laurylamine ethoxylate
(*d*) Soap base+polyethylene oxide wax 6,000

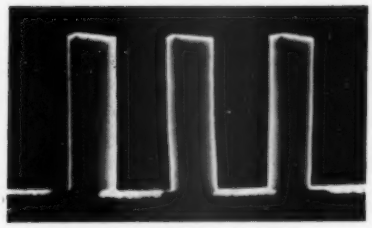


Fig. B III/9.

(*a*) Filled toilet soap base
(*b*) Filled toilet soap base+lauryl alcohol ethoxylate
(*c*) Filled toilet soap base+laurylamine ethoxylate.

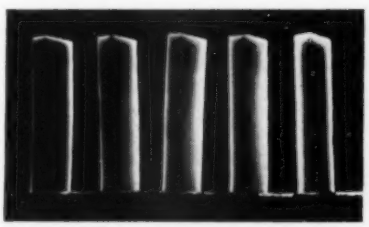


Fig. B I/8.

(*a*) Soap base
(*b*) Soap base+alkyl phenol ethoxylate
(*c*) Soap base+oleic acid diethanolamide
(*d*) Soap base+lauric acid diethanolamide
(*e*) Soap base+lauric acid monoethanolamide

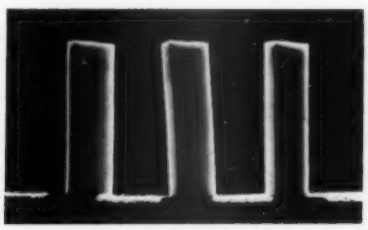


Fig. G II/10.

(*a*) Luxury soap base
(*b*) Luxury soap base+oleyl alcohol ethoxylate
(*c*) Luxury soap base+oleylamine ethoxylate

Table 2.—Weight Losses (in weight %)

No.	*Additive*	*After 1 month*	*After 18 months*
1	Soap base (no additive)	5·75	11·63
2	Oleyl alcohol ethoxylate	2·97	9·49
3	Lauryl alcohol ethoxylate II	4·91	9·51
4	Lauryl alcohol ethoxylate I	4·54	9·10
5	Alkyl phenol ethoxylate	5·37	10·57
6	Polyethylene oxide wax 6,000	4·38	8·41
7	Oleic acid diethanolamide	3·14	6·57
8	Lauric acid diethanolamide	2·94	6·65
9	Lauric acid monoethanolamide	3·56	8·04
10	Myristic acid monoethanolamide	4·00	8·04
11	Oleylamine ethoxylate	3·87	7·73
12	Laurylamine ethoxylate	2·91	6·54

Table 3.—Shore Hardness Test Results

Specimen	*Additive*	*A Surface hardness*	*B Breaking strain kp*	*C Flexure in 10^{-2}mm.*	*D Shore hardness*
B I/1	Soap base	100	10·8	49	64
B I/2	with oleyl alcohol ethoxylate ...	91	10·5	48	62
B I/3	with lauryl alcohol ethoxylate II ...	84	10·3	48	58
B I/4	with lauryl alcohol ethoxylate I ...	72	8·0	46	55
B I/5	with alkyl phenol ethoxylate ...	72	8·8	40	57
B I/6	with polyethylene oxide wax 6,000	66-99	6·3	33	50-60
B I/7	with oleic acid diethanolamide ...	63	7·5	68	59
B I/8	with lauric acid diethanolamide ...	63	6·8	61	50
B I/9	with lauric acid monoethanolamide	67	8·0	47	51
B I/10	with myristic acid monoethanolamide	73	8·5	48	56
B I/11	with oleylamine ethoxylate ...	71	9·3	54	56
B I/12	with laurylamine ethoxylate ...	83	8·8	50	60

content at the surface and inside the stabilised soap tablets after various storage periods.

In general, however, we can say that the incorporation of suitable ethylene oxide condensation products hardly influences the extent to which the required minimum amount of free alkali is maintained, nor do they affect the rubbing qualities and the swelling properties.

Increased lathering power in the cold is not so important with toilet soaps as with curd soaps, and here use is advantageously made of anion-active detergents such as alkyl-aryl sulphonates.

We have also attempted to measure the surface hardness, the flexibility and the elasticity of the soaps with the aid of the Haake consistometer. The latter is a versatile instrument which can serve *inter alia* for measurements of viscosity, elasticity, bending strength and surface hardnesses at temperatures of about −60° to +300°C.

The surface hardness was measured by the "cone flow point" method.

A specially dimensioned hard metal cone under a load of 300 g. penetrates so long and to such a depth in the tested material that the flow point was attained in the parts of the material adjacent to the side of the cone.

The cone flow point has the dimensions of a pressure and is defined by

$$F_K = \frac{G}{D}$$

where G is the load on the cone and f is the area of the base of the penetrated portion of the cone.

The cone was so dimensioned that the penetration depth S is equal to the diameter of the basal surface f. Accordingly:

$$f = \frac{S^2\pi}{4}$$

and

$$F_K = \frac{4\,G.1}{\pi S^2}$$

Since $\frac{4G}{\pi}$ is a constant factor, the flow point F_K depends solely on the depth of penetration S.

Only the fraction $1/S^2$ was therefore calculated. The value of specimen B I/1 was put equal to 100 and the values of the subsequent specimens were then put into relation to this.

In column A, Table 3, the surface hardness of the soap base is given as 100. On this basis the more highly ethoxylated condensation products impart greater hardness than the additives prepared with lower proportions of ethylene oxide. All the additive-containing soaps have a lower surface hardness than the initial soap base, but this does not unfavourably influence the quality.

Results obtained in rapid measurements of Shore hardness are also consistent with those obtained with

the Haake consistometer. Shore hardness tests are primarily intended for rubber vulcanisates and they give a direct measure of the depth of penetration of a normal needle.

The values enumerated in Table 3 naturally do not show the same trend as the cone flow point values. The cone does not penetrate as deeply as the needle. The cone flow point value strictly corresponds to the surface hardness. By contrast, the Shore hardness gives more information about the overall hardness of the soap tablet.

Consequently in Table 3 (under D) are listed the Shore hardnesses of the different soaps. The results are generally similar to those obtained with the Haake consistometer.

The breaking strength (col. B, Table 3, see Fig. 13) was determined by fixing the test piece in two supports 40 mm. apart and then loading the part between the supports with a small weight until the piece broke.

These Kp values are given in 10^{-3} mm. in Table 3 (column B).

The trend of surface hardness goes fairly parallel with that of breaking strength. The more highly ethoxylated products give better values, *e.g.* the fatty alcohols ethoxylates and the fatty amine ethoxylates. Variable values are obtained only when using polyethylene oxide wax 6,000.

The flexural strength (*i.e.* the elasticity) of the soap tablets was measured with the same Haake consistometer (Fig. 14).

Using the set-up mentioned (Fig. 14) (with the load 250 g. less than that leading to the break), the values enumerated in Table 3 (column C) were obtained. Once again the effect of fatty amine ethoxylates and fatty alcohol ethoxylates is particularly favourable. Anomalous results are obtained with polyethylene oxide wax 6,000 (low flexural strength) and fatty acid diethanolamides (higher flexural strength).

The texture of the soap is not detrimentally affected by incorporation of up to about 0·5% of polyethylene oxide wax 6,000 in association with perfuming agents; the perfume-retaining capacity is indeed enhanced.

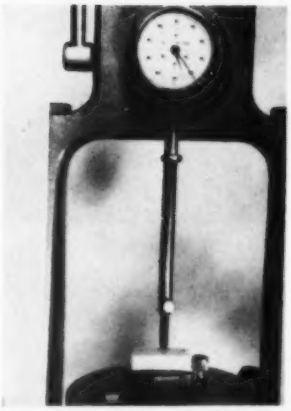


Fig. 11. Apparatus for determination of surface hardness by the consistometer flow point.

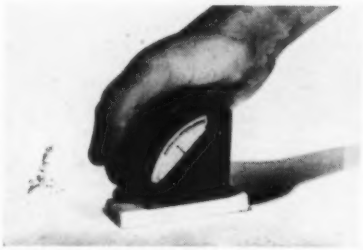


Fig. 12. Shore hardness manual tester in test position and at the completion of the test.

Fig. 13. Determination of breaking strength by fixing test piece between supports and loading the cone with weights.

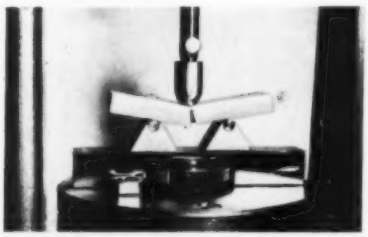


Fig. 14. Determination of flexural strength (elasticity) of a soap tablet.

Summary

Tests were made to demonstrate the achievement of certain improvements in soaps by incorporation of various synthetics.

High-quality soaps and others containing fillers or antioxidants were tested, and improvements were also obtained in these cases.

Incorporation of suitable ethylene oxide condensation products improves the soap structure and homogeneity, favourably influences the tendency to crack and to flake, and enhances the gloss and cold water lathering power.

Ethylene oxide condensation products (polyethylene oxide waxes in particular) are compatible with nearly all perfume oils and improve the perfume-retaining capacity of the finished soap.

The excellent dispersing action of fatty alcohol-ethylene oxide condensation products in particular impart to the soap an increased stability towards the hardness formers in water, so that the lathering quality is not adversely affected when the correct proportion of additive is used. This property in association with the marked detergent power of the fatty alcohol-ethylene oxide condensation products and the fatty amine polyethoxylates appreciably contributes to the improvement in detergent action of the soap. These advantages are also present when the soap is processed into flakes and needles.

The above-mentioned ethylene oxide condensation products also facilitate the incorporation of other additives such as antioxidants and complex formers which are added to soaps to counteract spotting and yellowing and to prevent rancidification. They also promote the blending with other ingredients such as carboxymethyl cellulose or polyacrylate, superfatting agents such as higher fatty alcohols, fatty acid alkylolamides, lanolin, sorbitol, etc.; they promote the protective action against lime soaps of certain phosphates and complex formers; finally, they facilitate the incorporation of disinfectant, deodorant, germicidal and like agents.

Apart from the advantages enumerated above, the fatty amine polyethoxylates in addition appear to counteract rancidity to a greater extent than the other agents.

Excellent results have already been registered in practice by the incorporation of fatty alcohol-ethylene oxide condensation products, *e.g.* of the type of Marlipal SU, ML and MG (trade names of Chemische Werke Hüls A.G.).

NONIONIC SURFACE ACTIVE AGENTS

By Leon Raphael, M.SC., F.R.I.C.

2. Industrial Applications

In the first part of this article in the March issue, Mr. Raphael considered the chemistry and manufacture of nonionics. Here he deals with industrial uses, illustrating his discussion with formulæ for dishwashers, silver polish, shampoos, dry-cleaners, sun-screen lotions and sanitisers.

DETERGENCY is a complex process involving wetting of the fabric, emulsification and suspension of the soil. A surface active agent may perform one of these functions, but often a mixture of surface active agents, or the addition of inorganic salts as builders, is required to improve detergent action. Nonionics of the alkyl phenol ether type, *e.g. Lissapol NX*, are quite good detergents when used alone. For light duty liquid detergents, used in wool washing, these products are very useful as they are non-substantive. They can, therefore, be readily rinsed from the fibres and the detergent solution is not rapidly exhausted. Care should be taken to choose a nonionic of suitable cloud-point. Wool washing is best carried out at about 50°C. and a nonionic with a cloud-point just higher than this value will be the most efficient. Wool washing has been found most effective in the isoelectric range, which is slightly acid, and for this purpose the nonionics are irreplaceable. These conditions of washing are most effective in reducing yellowing.[8]

A higher temperature is required for cotton washing (80°-100°C.) and the fatty alcohol ethers are quite satisfactory under these conditions. As the temperature is raised, the surface tension of an aqueous solution falls and the rate of wetting-out increased. The wetting action of fatty alcohol derivatives is therefore satisfactory at high temperatures and their emulsifying properties make them good cotton detergents.

On the industrial scale, the alkyl phenol ethers are used in the scouring of natural and synthetic fibres and are more economical than soaps. This is especially so in hard water areas. Dyeing is also facilitated after such treatment with nonionics.

Nonionics are stable to both acids and alkalies, although the fatty acid esters are hydrolysed when boiled with strong alkali. In keir boiling, where the alkali concentration is high, the fatty alcohol ethers are effective. Their stability to acids is utilised in wool carbonisation. With the exception of the mercaptan derivatives, *e.g. Nonic* 218, the nonionics are unaffected by bleaching agents such as hypochlorite or peroxides.

The strongly hydrophilic nonionics with long ethylene oxide chains are claimed to be good levelling agents for direct acetate dyes. Nonionics generally are also good antistatic agents in textile processing.

The foaming properties of nonionics are not as good as anionics, but a mixture of the two gives better foaming and detergent properties than either product alone. This synergistic action is utilised in dishwashing formulations. The addition of an anionic also raises the cloud-point of a solution of a nonionic. The following has been suggested as a suitable formula for a liquid dishwashing detergent.[9]

LIQUID DISHWASHER]

Tergitol Nonionic NPX	5
Alkyl aryl sulphonate	45
Lauric diethanolamide	10
Ethanol	15
Water and perfume	25

Nonionics can also be incorporated into detergent powders together with phosphates and silicates. Heavy duty liquid detergents are becoming familiar to the American market. These products are generally low-foamers designed for automatic washing machines. The active ingredients include nonionics such as the *pluronics* or ethylene oxide derivatives of tall oil, both types being low foaming surface active agents.

In conjunction with cationic germicides, nonionics are the principal cleansers in sanitiser formulations. Cationics are not particularly good detergents and in any case are too expensive to be used alone.

Both anionic and nonionic surface active agents are used in emulsion polymerisations to prepare latices. These surfactants are unaffected by hard water and replace the formerly used soap. Calcium pigments may now be incorporated into the latex.

Nonionics are claimed to be most efficient in metal- and glass-cleaning. They are useful emulsifiers in oils, used for drawing and forming operations, and have been successful in metal-pickling baths. The efficiency of tarnish removal by silver polishes is improved by nonionics. Here is a typical formula—

SILVER POLISH

Nonionic	6·5
Polyglycol 400	4·0
Ammonium Carbonate	2·6
Soap	1·5

Nonic 218, which has exceptional wetting properties, is recommended for shampoos. Unfortunately, as stated above, it cannot be used with peroxide bleaches. The following formula is quoted from Sharples Literature.[10]

SHAMPOO

Nonic 218	4
Alkyl aryl sulphonate	16
Water	80

Dry cleaning

The nonionics are soluble in aromatic, petroleum and chlorinated solvents. A dry-cleaning bath contains water to remove "sweet" spots and the nonionics assist in "carrying" this water. A nonionic, or a mixture of anionic and nonionic, may be used in the formulation, *e.g.*

DRY-CLEANING BATH

Tergitol Anionic 7	44
Tergitol Nonionic NPX	22
Oleic acid	3·5
Monoethanolamine	1·8
Sodium nitrite	0·8
Naphthalene	27·9

Tergitol Nonionic NPX is water soluble. A hydrophobic alkyl phenol ether is also recommended for dry-cleaning, together with alkylolamides.

Pesticides

The solubility of nonionics in aromatic solvents is utilised in the preparation of insecticide emulsions. A concentrate of 25 parts of DDT, 5 parts of a nonionic emulsifier and 70 parts of solvent, such as xylene, can be diluted with water to produce a stable emulsion. The good wetting properties of the nonionic assist the spreading of the emulsion on foliage. Weed killers, such as the chlorphenoxyacetic acid derivatives, can be similarly dispersed.

In leather processing, nonionics are used in soaking, wetting, degreasing and tanning, because of their compatibility with acids, alkalis and salts. They also help in the finishing process of oiling of leather, assisting penetration of oil into the pores, and the spreading action of wax finishes.

The control of dust in mines and other industrial concerns is assisted by the use of nonionics. Their rapid wetting action helps to keep down the hazards.

Cosmetics

The only hydrophilic nonionic emulsifiers other than ethylene oxide derivatives are the sucrose esters. These may replace the *Tweens* and have the advantage of being completely non-toxic. A number of cosmetic formulations for creams and lotions utilise sucrose esters in the aqueous phase and *Spans* in the oil phase. An example of a silicone-based sun-screen lotion is the following:[44]

SUN-SCREEN LOTION

A.	Butyl stearate	10
	Span 60	2
	Isopropyl *p*-aminobenzoate	1·5
	D.C. 555 silicone oil	2·0
B.	Sucrose palmitate	2·5
	Methyl paraben	0·2
	Water	81·8

Each mixture is heated to 75°C., and B, the aqueous phase, is added with stirring to A, the oil phase. Sucrose esters may also be used as the detergent in toothpaste. Unlike the ethylene oxide derivatives, solutions of sucrose esters do not have "cloud-points" at high temperatures.

Perfumes may be solubilised in aqueous solutions by ethylene oxide derivatives. For a C_{16} alcohol derivative, the most suitable nonionic surface active agent has an average ethylene oxide content between 15 and 25 moles per mole alcohol.[14] Unfortunately, phenolic type preservatives are inactivated by nonionics, but it is believed that sucrose esters may be compatible.

In Canada a large tonnage of nonionics is consumed in the pulp and paper industry. They are used for paper felt washing and for pitch dispersion.[12]

Iodophors

Nonionics form addition compounds with phenols, sodium phosphate and iodine which may be used to advantage in disinfectant preparations. One very useful outlet is in the production of iodophors.[13] Iodine forms a water-soluble complex with alkyl phenol ethers, in which 80% of the available iodine is bacterially active. The nomenclature of iodophors indicates the percentage of available iodine in the product; *e.g.* Iodophor 10 contains 10% available iodine. These complexes are quite stable at room temperature, losing 10% of their iodine over 12 months. The same loss is experienced at 110°F. in 45 days. Iodophors are no more toxic than the original nonionics. In certain cases they are primary irritants when the contact sites are covered, but are quite safe when contact sites are exposed to air. Bacterial tests showed these products to be highly effective at 1 p.p.m. concentration available iodine against *E. coli* and *M. pyogenes var.* Their efficiency is a maximum in acidic environment. A suitable sanitiser formulation contains

SANITISER

Iodophor	17·5
Nonionic	5
Phosphoric acid	10
Water	67·5

The excess nonionic helps to prevent phase separation.

Raw materials

The increasing use of nonionic surfactants has led to the utilisation of a cheap hydrophobic base in the form of tall oil, a by-product of the kraft paper-making process.[15] It is chiefly a mixture of rosin acids and fatty acids in approximately equal proportions. The rosin acid derivatives of ethylene oxide are more stable, resisting hydrolysis to a greater degree, than the fatty acid esters, decomposing only under severe alkali treatment. These nonionic esters of tall oil are yellowish-brown viscous liquids or pastes and, in general, have properties and applications similar to polyglycol esters. Alkyl phenols, despite their high price, are still the most widely used hydrophobic bases for reaction with ethylene oxide. A number of different alkyl- and dialkyl-phenols are available, the alkyl side chain ranging from 8 to 15 carbon atoms. They are produced by condensation of phenol with an olefine such as diisobutylene (C_8), tripropylene (C_9) or tetrapropylene (C_{12}). The equipment used for the manufacture of ethylene oxide derivatives is expensive, putting a high cost on producing low-tonnage specialities. In the United States the price of ethylene oxide is 15·5 cents per lb., less than half the price in this country, and although alkyl phenols are expensive, the greater the ethylene oxide content the cheaper the product on a materials cost basis. For cheap hydrophobics such as tall oil the reverse is the case. On the other hand, a larger ethylene oxide content means longer reaction time and, therefore, high operating costs. The largest market for alkyl phenol ethers requires 60-70% ethylene oxide, which is economically the most favourable composition.

The lower price of ethylene oxide in the United States has permitted nonionics to compete favourably with other surface active agents. They are continuing to increase their share of the synthetics markets, now representing over 20%. In the U.K. the annual production of ethylene oxide must now be over 20,000 tons, and with the probability of two large companies introducing the direct oxidation process in the near future, we may see an increasing usage of nonionics.

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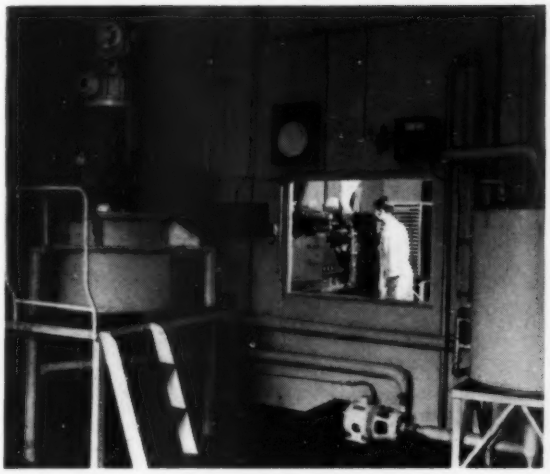
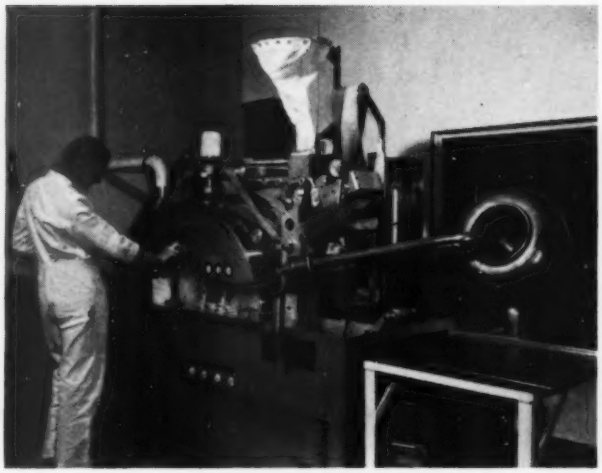


Powder blending equipment.



Encapsulation machine.

Drug Houses of Australia Link-up with American Cyanamid

New Building for Encapsulating Antibiotics

Drug Houses of Australia Ltd., through its subsidiary, D.H.A. (Laboratories) Pty. Ltd., has now in operation an additional unit for making and filling soft gelatin capsules. The plant was officially opened by the Hon. W. F. Sheahan, Minister for Health for New South Wales, in the presence of a representative gathering of the medical and pharmaceutical professions.

Mr. Sheahan said the project marked the coming together of Australian capital with American know-how and expressed his pleasure at the establishment of another manufacturing activity in New South Wales.

Mr. P. A. Berry, chairman and managing director of D.H.A. (Laboratories) Pty. Ltd., in introducing the Minister, briefly recapitulated the circumstances under which this activity was brought into being.

For a number of obvious reasons, it was desirable to carry out as many manufacturing operations as possible in Australia, and an agreement was entered into between Drug Houses of Australia and American Cyanamid Co. by which Drug Houses of Australia would manufacture a number of Lederle products in Australia. The manufacture of tablets and ointments is now carried out in the pharmaceutical laboratory at Rozelle, while a special building has been erected at Rosebery for the encapsulation activities. The building was designed by D.H.A. technicians and chemical engineers in collaboration with Lederle experts.

The actual machine used for the preparation and filling of the gelatin capsules is unique insofar as it can fill liquids, pastes or powders into one-piece soft gelatin capsules. Known as the Accogel machine, it was developed over a number of years by American Cyanamid Co.*

Other specialised equipment was also imported from America and the United Kingdom, but a high proportion of the plant was constructed in Australia. Technical experts were sent from Australia to America for training and, on completion of the plant, an expert came out from America to assist in getting the Accogel machine into operation.

Capsule inspection section.

Extremely rigid limits of temperature and humidity are necessary for the satisfactory operation of the equipment. Although at present being used only for antibiotic preparations, it is intended that the use of the encapsulation unit will be extended, in the near future, to other medicinal products.

The visitors were very impressed with the tour of the plant, and particularly with the operations of the Accogel machine. Molten gelatin is formed into two ribbons, the lower one being sucked into cavities to form one half of the capsule. The measured amount of medicament is then automatically placed in the cavity and the ribbon moves on to a point where the upper ribbon is heat-sealed to the powder-containing portion. The soft capsules are then printed and ejected from the ribbon web into a revolving pan, and are then placed in stainless steel trays for drying.

The counting of the finished capsules by an electronic machine which could be pre-set to accurately deliver any required number of the capsules was also noted with interest. The care with which every stage of the operation was supervised was apparent.

After leaving the encapsulation plant, the visitors were conducted through the Soluvac and Ampoule laboratories.

* The Accogel machine was described and illustrated in the article on the Cyanamid factory in the May issue.

Britain's Biggest Display of Chemical Pla

WHAT TO SEE AT OLYMPIA THIS MONTH

Britain's first Chemical and Petroleum Engineering Exhibition is being staged this month at Olympia, London, from June 18 to 28. It has the support of the British Chemical Plant Manufacturers' Association and the Council of British Manufacturers of Petroleum Equipment. During the exhibition a symposium on "The Organisation of Chemical Engineering Projects" will be held by the Institution of Chemical Engineers and the Institute of Petroleum. Some 250 exhibitors will take part in the show. Here is a handy alphabetical guide to exhibits of special interest to the manufacturing chemist.

APV Co. Ltd.

Stand 5G, ground floor, Grand Hall

An 80 ft. high **benzole distillation** column, 4 ft. 6 in. diam. will be the centre of a display of models, plates and photographs illustrating the company's work in the continuous and batch distillation of coal tar products and industrial and potable alcohol. The APV-West plate will be shown in a number of types and sizes supported by explanatory diagrams and an operating rig. Among the models is that of the Beckton tar acids distillation plant.

Heat exchangers will be prominent with examples of the two widely used types. The paraflow plate heat exchanger will be shown in sizes ranging from a small wall mounted type HXC up to the large type CHF. The Rosenblad spiral heat exchanger will be shown in a stainless steel model.

Of particular interest will be the new APV **plate evaporator.** By using plates on the climbing and falling film principle instead of tubes, an extremely simple and compact evaporator has resulted requiring only 8 ft. of head-room. The saving in first and installation cost is said to be appreciable.

In this APV evaporator plates on the climbing and falling film principle are used instead of tubes. It requires only 8 ft. of head room.

Audley Engineering Co. Ltd.

Stand 6E, ground floor, Grand Hall

Audco lubricated taper **plug valves** manufactured from materials including cast iron, carbon, alloy and stainless steels, bronze, monel metal and aluminium will be exhibited. These include straightway, multiport and steamjacketed designs. Pressures from the finest vacuum up to 5,000 p.s.i. are catered for and sizes range from ¼ in. to 24 in. bore.

Recently, the company obtained the manufacturing licence for the Annin valve from the Annin Valve Co. of Los Angeles. For some applications this advanced type of control valve can be used as a shut-off valve. Examples will be displayed.

Balfour Group

Stand 5L, ground floor, National Hall.

There will be exhibits by Henry Balfour and Co. Ltd., engineers and designers of equipment for the gas, oil and petroleum industries, George Scott and Son (London) Ltd., and Enamelled Metal Products Corporation (1933) Ltd.

New plant on display employs varied principles of vacuum drying, molecular distillation, tumbler drying, high-pressure processing and kinematic high frequency.

The following plant will be shown:

Scott-Smith molecular still, which separates or purifies high molecular weight or heat-sensitive materials under high vacuum conditions.

Scott Patent forced circulation heater, a heat exchanger that achieves a high rate of heat transfer on difficult chemical liquors.

A series of Scott-Willems patent dispersitrons, whose design, based on the technology of kinematic high frequency, offers an efficient method of processing in many branches of chemical manufacture.

Goulds-Pfaudler glassed pump, which handles corrosive materials without the risk of metallic contamination or product adherence.

British Pfaudler glassed steel autoclave, a glassed steel jacketed vessel—of special interest to manufacturers of polymers—in which reactions can be carried out at high pressure and under the severest corrosive conditions.

Pfaudler conical glassed steel dryer-blender, which uses a tumbler-drying action to produce a homogeneous product.

F. W. Berk and Co. Ltd.

Stand 6K, ground floor, Grand Hall

The **Berk spray dryer** offers new designs for spray unit, air flow and dried product recovery. A full-size silent running, slow speed ring jet spray unit will show combined use of centrifugal force and air blast for producing spray of controllable fineness. A fully operating pilot spray dryer will demonstrate single point discharge from drying chamber and cyclones achieved through air ejectors.

The company's **fluid bed dryer** has just been brought out, and a glass pilot plant can be observed in operation. Fluidisation is a new technique for handling granular or powdered solids in air by maintaining a "boiling" movement in a turbulent layer over a porous bed. Application of fluidisation for drying has begun only recently and specialised designs adapted to properties of materials promise interesting developments.

The Berk ring dryer will show how prolonged airborne circulation can be maintained in fully controllable pneumatic dryer, whilst the drying air is renewed continuously.

The Berk pilot plant ring jet spray dryer.

Plant, Equipment and Services

Birlec Ltd.

Stand 1A, ground floor, Grand Hall

A scale model will illustrate a large neutral-gas generating plant, shown for the first time. Other Birlec **gas plants** produce reducing or carburising atmospheres. Coal gas, petroleum gases and ammonia are possible sources, according to the product-gas required, and the respective costs.

Birlec **dryers** may be incorporated to remove water vapour to a very low level. These dryers adsorb moisture on activated alumina, the adsorbent being reactivated periodically without loss of efficiency. Water vapour can be removed to very low dewpoints, — 70°C. (1·5 p.p.m.) being readily attainable.

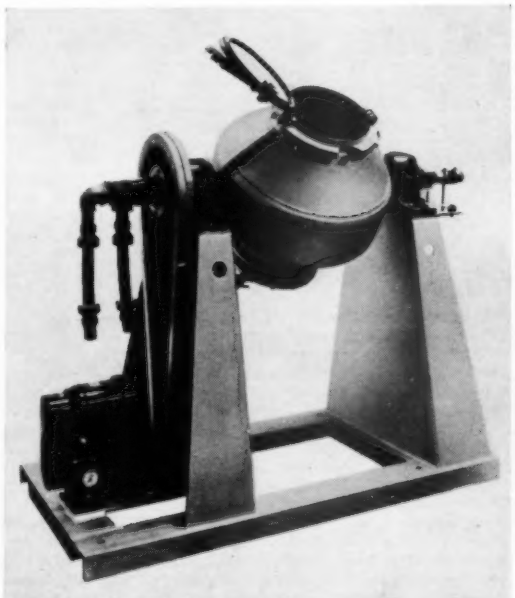
Dryers exhibited will include a BA50, suitable for drying gases at 1,250 s.c.f.h. to an outlet dewpoint of — 60°C.; a BX50 automatic dryer for compressed air at 150 p.s.i.g.; and a high-pressure G 2·5 cartridge-type dryer for air at 6,250 p.s.i.g. In addition there will be a small laboratory dryer which uses molecular sieves as the adsorbent, making it capable of reaching extremely low dewpoints.

William Boulton Ltd.

Stand 14, inner, gallery, Grand Hall

The main feature will be a patented machine which effects **fine grinding** with close control by high-frequency small amplitude vibrations. It has been developed in conjunction with W. Podmore and Sons Ltd. of Shelton, Stoke-on-Trent.

Other units will include a double paddled **stirrer** for granular or powdered solids in a vessel having a conical or domed base. The paddle imparts a component of axial and radial circulation, thus reducing the tendency for the solids to form a layer at the walls. It is made for general use in industry under licence from the Atomic Energy Authority and offers many advantages for use in solid gas reaction vessels; also a 44 in. diameter gyratory screen and a Muller mixing machine which can be supplied with cast iron, granite or porcelain rollers.



The Pfaudler conical glassed steel dryer blender uses a tumbler-drying action to produce an extremely homogeneous product.

British Acheson Electrodes Ltd.

Stand 13J, ground floor, Grand Hall

This stand will demonstrate corrosion-resistant impervious **graphite.**

The main display will be a structure rising to 20 ft. carrying a complete plant for the production from hydrogen and chlorine of pure anhydrous hydrogen chloride gas, as used in the manufacture of chlorinated plastics, *e.g.* P.V.C., etc. An Acheson graphite combustion chamber with a *Karbate* impervious graphite burner is used for burning chlorine in hydrogen to produce HCl gas. The product is then fed to a *Karbate* 8A falling film absorber. The product acid estimated at 33/35% w/w HCl is then fed to a falling film evaporator, a 19 tube *Karbate* heat exchanger working in effect as a cooler absorber. The source of heat is steam admitted to the jacket. The hydrogen chloride gas is evaporated off leaving constant boiling acid approximately 20% concentration which is discharged as bottoms acid and is cooled in the Series 90A. *Karbate* standard heat exchanger.

The product gas of approximately 90% HCl, 10% H_2O passes to a primary condenser which is again a Series 90A. *Karbate* standard heat exchanger. In this latter case cooling water is fed to the steel jacket of the heat exchanger. The H_2O passes out as reflux acid (estimated 40% by weight). The hydrogen chloride gas then passes to a second Series 90A. *Karbate* standard heat exchanger which serves as a secondary condenser for which the coolant is refrigerated brine.

A *Karbate* 6 in. size MV entrainment separator is used to give a final moisture removal from the product HCl gas.

Birlec's newly designed neutral gas generating plant will be on show.

British LaBour Pump Co. Ltd.

Stand 16K, ground floor, Grand Hall

A **chemical pump** in the company's new SZ range will be on view. Particular attention has been paid to ease of maintenance and service, and an important feature is that the impeller and internal components can be removed for inspection without disconnecting suction and discharge pipelines, or disturbing the motor.

These pumps, which are available as flooded suction units, will be augmented by examples from the company's usual range. One is the type UZ pump for handling HCl, ferric chloride solutions, etc. Vulcoferran lined, it is fitted with a special mechanical seal, thereby obviating the use of special alloys.

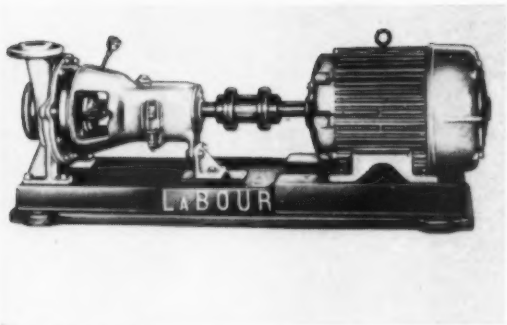
The BG pump developed from the type G is a vertical pump and functions without packed gland or mechanical seal. It is particularly suitable for applications in which maintenance must be at an absolute minimum, and for handling corrosive and dangerous liquors.

British Oxygen Engineering Ltd. and British Oxygen Linde Ltd.

Stand 4B, ground floor, Grand Hall

Prominence will be given to plant used for the supply of high-purity **oxygen** and **nitrogen** in tonnage form. Smaller plants which have capacities of 100 cu. ft. of gas per hr. and upwards will also be illustrated.

There will be a graphic representation of the service provided by the companies in making plant available throughout the world. This plant is designed to meet the



This SZ British LaBour pump is available as a flooded suction unit. The impeller and internal components can be removed for inspection without disconnecting suction and discharge pipelines, or disturbing the motor.

specific requirements of customers and each stage of its development, from consultation and site clearance to commissioning, will be shown.

Other exhibits will illustrate the companies' other activities, including the supply of complete plants for rare gas production, together with ancillary equipment such as pumps, compressors, vaporisers, mobile liquid oxygen tanks of 50 and 500 U.S. gal. capacity, and static liquid oxygen storage tanks in the million cu. ft. scale.

Thomas Broadbent and Sons Ltd.

Stand 4L, ground floor, National Hall.

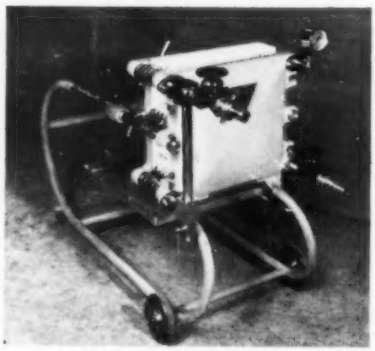
Broadbents will show a new variable speed centrifuge with labour-saving features. It is a suspended under-driven machine with a mechanical unloading plough discharging through the basket bottom. The plough will empty the basket in a very short time and thus reduces processing time quite appreciably. Heavy manual labour is eliminated.

The plough itself is counter-balanced for easy operation. As it is mounted clear of the suspended machine it is not subjected to vibration when an out-of-balance load is present, so rapid wear of the plough parts is avoided. The discharge chutes open automatically when ploughing speed is obtained. Ploughing is usually done at 30 r.p.m. This low speed avoids the crystal damage which is often a disadvantage when using machines which plough the solids out of the basket at full speed.

A hydraulic drive motor gives three speeds for feeding, drying and discharging. These speeds are readily variable to suit the particular material being treated at any time. Mechanical brakes are avoided by using this same hydraulic system to bring the basket to rest.

Hydraulic pressure is provided by an electric motor and pump which can be separately mounted at a considerable distance from the machine. This is an advantage in cases where the products being treated are of an inflammable nature. The electrical control gear can also be mounted outside the inflammable area and the only electrical equipment on the machine itself is a flameproof interlock switch.

A self-balancing fume-tight cover is fully interlocked so that access to the basket can only be obtained at ploughing speed, or below.



The variable speed 54 in. Broadbent type 58 centrifuge. ▶

The three-point suspension system employed is very well proved and absorbs vibrations set up by out-of-balance loading. The machine is, therefore, suitable for mounting either at ground level or on an upper floor. Very heavy concrete foundations are not necessary and installation costs are reduced accordingly.

All contact parts of the centrifuge are made of stainless steel to resist corrosion. Automatic operation can be provided from the end of the feeding operation to the commencement of ploughing.

Special attention has been paid to ease of maintenance. For instance, the complete outer casing can be lifted from the base to allow full inspection of the basket and the bearing housing can be removed in one piece for stripping and repair away from corrosive chemicals.

Cannon (CP) Ltd.

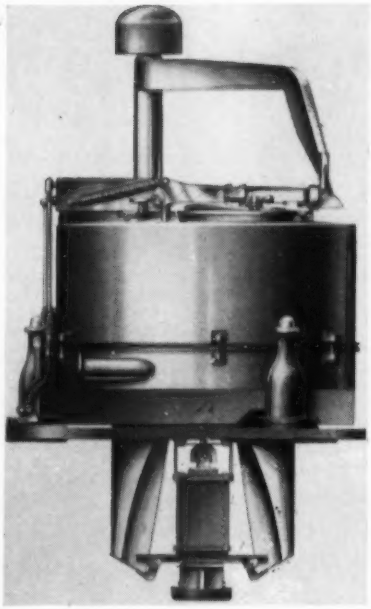
Stand 8G, ground floor, Grand Hall

The centrepiece of the stand will be a 200-gal. **distillation plant,** standing over 16 ft. high. The full range of distillation plant covers capacities from 1 to 1,000 gal.

Other **glass-enamelled cast iron** and steel chemical plant will include—

A glass enamelled mild steel steam jacketed pan of 50 gal. capacity, suitable for working steam pressures up to 75 lb. p.s.i.; this vessel is fitted with an enamelled cast iron bottom outlet valve with fluon seating.

A glass enamelled cast iron steam jacketed pan with bottom outlet of 50 gal. working capacity of similar design to the British Standard Pan of that size.



(Below). **In this Carlson Zenith Princess filter clarification and sterilisation can be carried out in one operation by adapting the filter as a double unit with a change-over plate. Outputs vary according to the liquid to be filtered and the number of filter plates used.**

A range of 20 gal. glass enamelled cast iron digestors, unjacketed, steam jacketed and electrically heated.

A large glass enamelled mild steel anchor type agitator of tubular construction.

Various glass enamelled cast iron agitators and thermometer pockets.

Small equipment suitable for use in laboratories.

John C. Carlson Ltd.

Stand 41, outer, gallery, Grand Hall

The new Zenith Princess **filter** constructed in stainless steel will be exhibited. There will also be a Zenith filter equipped for kieselguhr filtration along with a Carlson-Schenk dosing unit. The Pilot and Ariston Princess filters will be available for inspection, in stainless steel and *Nolac* as well as the normal materials of construction.

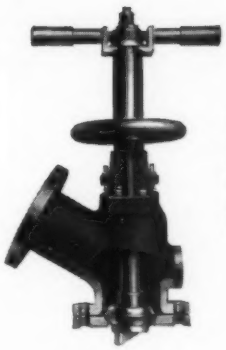
For **small-scale filtration** there will be shown cylinder filters and a range of laboratory and experimental filters. Further items include a rinsing machine, tincture presses, water scale inhibiting units, as well as ancillary equipment for filtration work.

A complete range of filter sheets and filtering materials will also be exhibited.

T. and C. Clark and Co. Ltd.

Stand 7M, ground floor, National Hall

A new standard **enamelled reactor** will be featured. Two unusual features are a bolted-on mild steel steam jacket and the provision of four large openings in the cast iron cover. The bolted-on jacket enables the inner pan to be removed and replaced and re-enamelling to be carried out quickly and without damage to the jacket. The four cover openings are fitted with mild steel enamelled covers and this permits a wide variation of inlet openings, sight glasses, thermo pockets, baffles, etc., to suit particular needs. Another



Here is a downward closing valve developed by T. and C. Clark and Co. Ltd.

novelty will be a glass-enamel lined **valve** with a seating of Fluon (PTFE). This combination of resistant materials makes the valve ideal for many chemical jobs.

Consolidated Pneumatic Tool Co. Ltd.

Stands 6D and 8E, ground floor, Grand Hall

Some new lines of **compressed air plant** and equipment, new versions of established products and a selection of power tools and compressors will make this stand one of the most comprehensive displays the company has staged in recent years.

Davey, Paxman and Co. Ltd.

Stands 7C and 5D ground floor, Grand Hall

A 10 sq. ft. Paxman **rotary vacuum filter** one of a range of filters used for extracting moisture from effluent slurries, will be shown. These filters are now widely used and are reported to save on kiln or other methods of heat drying.

The mechanical extraction of moisture has been installed by many manufacturers to reclaim deposits hitherto discharged to waste. This last has particular bearing on the discharge of noxious or harmful effluents into our internal waterways and rivers or again in washing processes where water is at a premium, after the extraction of the deposits normally valuable in themselves the water can be returned to the system.

Other exhibits will include photographs and samples of welding ranging from high-pressure boiler drums meeting Lloyds A1 standards to fabricated vessels for the chemical industries in non-ferrous metals.

Dewrance and Co. Ltd.

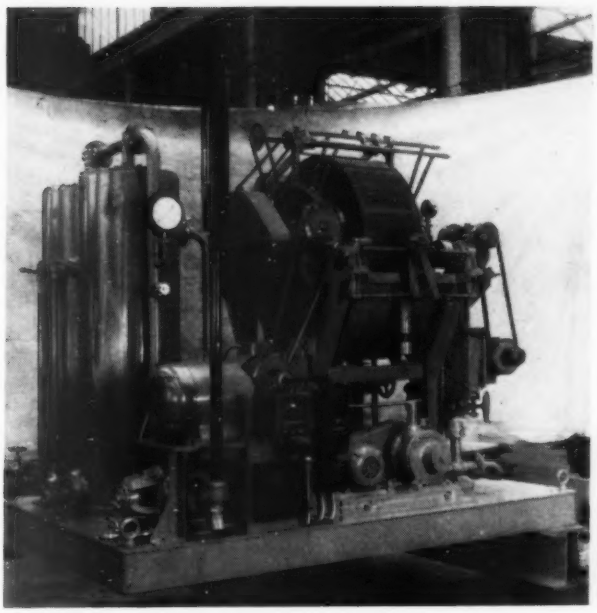
Stand 2E, ground floor, Grand Hall

A wide selection of **valves** and **gauges** will be on view. The Dewrance-Ashcroft pneumatic transmission system for pressure indication is suitable for use in oil refineries, chemical and power plants, or wherever it is desirable to confine inflammable, poisonous or corrosive liquids and gases close to their source, away from the central control point. Liquid level indicators, " gun-pakt " expansion joints, and lapping machines will also be exhibited.

Doulton Industrial Porcelains Ltd.

Stand 3Q, ground floor, National Hall

A working model which demonstrates some of the industrial uses of **porous ceramics** will show the processes involved in gas diffusion, removing suspended solids from liquids and filtering compressed air.



The Paxman rotary vacuum filter is used for extracting moisture from effluent slurries.

The company will also display a range of ceramic products including porous ceramics, hard porcelain grinding materials and acid resisting stoneware, all are chemical resistant. Hard porcelains will be shown used as ball mills and as **linings for grinding mills.** A ball mill of entirely new design is being displayed for the first time.

There will be actual units of **chemical plant** embodying acid-resisting stoneware and thermal shock resisting stoneware which indicate some of the uses of ceramic products.

Examples of the many shapes, sizes and grades of porous ceramics will be on show with sample **filter** units in which these products are used. A small size **aerating floor** which is typical of the many types constructed for power handling will also be on the stand.

Firth-Vickers Stainless Steels Ltd.

Stand 4D, ground floor, Grand Hall

Centri-spun weld neck flanges suitable for many of the applications which until recently necessitated use of the forged variety will be among the items shown. In recent years, serious delays have arisen from shortages of suitable flanges for coupling pipes. In some cases, particularly where the installation is intended to operate under conditions of low pressure, sand cast flanges are suitable, but in many other instances, the designer has specified forgings.

This is frequently unnecessary. Research by Firth-Vickers Stainless Steels Ltd. has proved conclusively that **centri-spun flanges** are entirely suitable for many of these applications.

In addition, **stainless steel sheets** in a variety of finishes will be seen, together with stainless steel bars and a selection of static and precision castings.

George Fletcher and Co. Ltd.

Stand 13E, ground floor, Grand Hall

Equipment to be displayed by this company includes the *Amarilla* rotary displacement **pump** which is made in a wide range of sizes for handling sludge, heavy oil, semi-fluids and thick mixtures of slurry, pastes, etc. For the chemical or food industries these pumps can be made in stainless steel and can easily be dismantled for cleaning. Three pumps will be seen in operation on the stand pumping heavy viscous materials.

The company's other products include stills and autoclaves, multiple effect evaporators of vacuum and medium pressure type, crystallisers, vacuum pans, surface and barometric condensers.

Flexibox Ltd.

Stand 6R, ground floor, National Hall

On show will be the new super-cooled **mechanical seal** type RRH for rotary shaft equipment operating at high temperatures, high pressures and high speeds of shaft rotation. It differs from the standard type RR in that it is fitted with a special cooled sleeve. Applications include process pumps handling petroleum fractions, gases and chemicals, and boiler feed pumps for both conventional and nuclear power stations.

Foamite Ltd.

Stand 14J, ground floor, Grand Hall

The most modern development is a completely re-designed family of 2-gal. **fire extinguishers** with steel bodies and using the latest seam-welding techniques. These latest designs embody a considerable degree of standardisation of parts for the various types of extinguishers, thus minimising replacement parts stock.

Dry chemical extinguishers will shortly be available in a 2-lb., 7-lb., 10-lb., 20-lb., 25-lb., 150-lb. and 350-lb. capacity, all pressurised, the 150-lb. and 350-lb. units being of a revolutionary design, incorporating a spherical container which has

many important features, including ease of mobility, low centre of gravity, light weight, and speed of application.

W. J. Fraser and Co. Ltd.

Stand 2G, ground floor, Grand Hall

Exhibits will include models, diagrams and photographs of large and medium-scale **process plant** engineered by the firm, and a ten-minute version of their film, "Experience at your Service." There will be a model of a plant for the desulphurising of coke oven gas which they are engineering and constructing under licence from the Appleby-Frodingham Steel Co. Also on view will be the model of a fertiliser plant now being completed in New Zealand.

A section of the stand will be devoted to Frasers' fabrication and pilot-scale development facilities.

As examples of Frasers' range of special-purpose plant items two working models are to be shown—the Nauta mixer and the Fraser pin granulator. The Nauta is a counter-current mixer for liquid-solid or solid-solid mixing. The Fraser pin granulator is a novel machine, primarily intended for use as a pre-granulator, developed in co-operation with Scottish Agricultural Industries Ltd. It is the latest addition to the range of Fraser granulation and fertiliser manufacturing plant.

Gardners of Gloucester

Stand 6N, ground floor, National Hall

This company designs and manufactures an extensive range of mixing, sifting, drying, grinding and other types of machines and plant, and their main exhibit will be a 14 ft. diam. stainless steel double cone **mixer.** This particular machine is for export.

An operating exhibit will be an 8 in. stainless steel double cone laboratory mixer which is their smallest size in this type.

A 6 ft. length band **conveyor** will be on view complete with four-speed reversing gear-box and magnetic clutch.

General Descaling Co. Ltd.

Stand 15, outer, gallery, Grand Hall

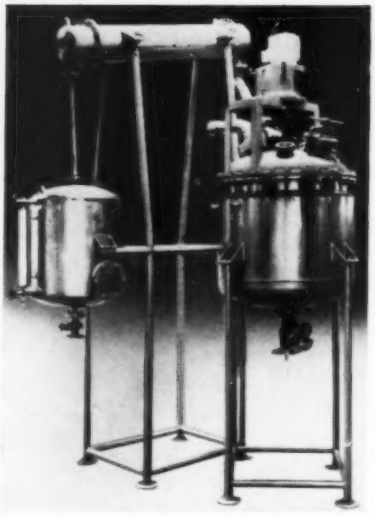
The main function of the company is to provide a complete service for the **cleaning** of sewers, drains, culverts and industrial pipelines of every description. They also manufacture **oil pipeline equipment,** including scraper traps and closures, gauging, cleaning, swabbing and batching pigs, go-devils, and magnetic and isotope type pig detectors.

Their stand will be devoted to these two aspects of their business. The display on the oil pipeline side includes a launching trap fitted with a closure and one of the latest designs of a pig. The theme of the industrial pipeline descaling side is the latest lightweight rotary boring machine.

General Electric Co. Ltd.

Stand 6Q, ground floor, National Hall

Exhibits will include a Woods aerofoil fume cupboard **extractor fan,** specimens of specially-coated conduit tubing, flame-proof heaters and cables. The fume cupboard fan is polythene-protected. Its cylindrical shape and axial air movement enable it to be inserted into a run of ducting, the effectiveness of the protection rendering the motor immune from the effects of a corrosive gas stream. The fan



This Giusti distillation unit consists of a 50 gal. stainless steel still, a reaction vessel, a vapour in tube condenser and a 30 gal. stainless steel receiver. The unit is connected by stainless steel pipe work.

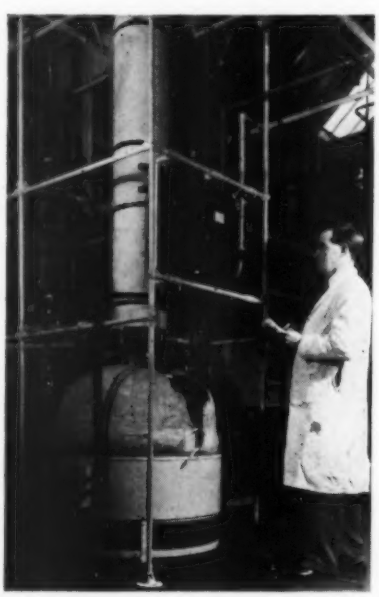
is suitable for handling gases at temperatures up to 120°F.

The G.E.C. **air-pressurised electrical system** which is to be shown has now been approved by H.M. Inspector of Factories under cover of Certificate No. 203/IS.3050.

T. Giusti and Son Ltd.

Stand 5N, ground floor, National Hall

Emphasis will be placed on **distillation plant.** One unit will consist of a 1,000 gal.



Isojackets and Isomantles, with automatic temperature controls, are being exhibited by Isopad Ltd. Here they are used on glass plant for essential oil distillation.

reaction vessel, stainless steel column and condenser. The reaction vessel will have a stainless steel spiral jacket. Its special construction offers advantages for heating under pressure or alternatively with a cooling medium.

The second plant will be of unit construction and will consist of a 50 gal. stainless steel still with inner vessel for use with vacuum or pressure and a jacket for heating by steam. Working in conjunction with the reaction vessel will be a 30 sq. ft. vapour-in-tube type condenser and 30 gal. stainless steel receiver. The entire unit will be mounted in framework and connected by stainless steel pipe.

A section of the stand will be devoted to the exhibition of industrial separators and clarifiers made by Westfalia Separator AG, for whom T. Giusti and Son Ltd. are agents in the U.K.

Griffin and George Ltd.

Stand 19, inner, gallery, Grand Hall

Particular attention is being given to the VPC **gas-liquid chromatographic apparatus** for organic analysis which will occupy a prominent position.

The company manufactures laboratory furniture in wood and, in association with Grundy Equipment Ltd., will demonstrate their range of metal unit **furniture.**

The Griffin-B.C.R.A. isothermal bomb **calorimeter** is of a work-studied design built into a bench for use by a seated operator and capable of determinations on coal, coke, oils, etc., with standard deviations of less than 0·1%.

The Griffin-Raleigh water **deioniser,** which is being exhibited for the first time, is a mixed resin ion-exchange unit designed for regeneration *in situ,* incorporating a built-in conductivity indicator with A.C. bridge circuit. Two models are available with cylinders of 3½ in. and 6 in. external diam.

G. A. Harvey and Co. (London) Ltd.

Stand 1F, ground floor, Grand Hall

A feature of this stand will be a **vacuum pressure vessel,** entirely of welded construction, weighing some 23 tons and made from mild steel plate ⅝ in. thick and heavier.

Heavy-duty *Rotarprest* heads will be represented by the display of a 12·75 ft. diam. dished end made from four plates welded together of 1·5 in. thick *Colclad* which consists of a layer of Austenitic stainless steel bonded to boiler quality mild steel. Steels of this description are used to resist high pressure in conjunction with resistance to corrosive media.

The range of standard heads produced by this process is up to 15 ft. in diam., using a 17 ft. 6 in. blank and in thicknesses up to 4 in.

The range of "Harco" perforated metals and plastics will display numerous patterns needed for all kinds of sifting, filtering and grading of chemicals and such diverse materials as coal, stone, cereals and food products.

Hathernware Ltd.

Stand 3B, ground floor, Grand Hall

Corrosion-resistant **ceramic** items will be among the exhibits. Shown for the first time will be a selection of plant reinforced with a wrapping of glass fibre and resins under the firm's trade mark *Fibresin.* It is claimed to be strong and economical, to protect from mechanical

Drying and grinding are carried out simultaneously in this Atritor dryer-pulveriser being exhibited by Alfred Herbert Ltd.

damage and to provide heat and electrical insulation. It is a corrosion-resistant alternative to iron and steel armouring but does not require constant re-painting. Principal exhibits will include towers, absorption units, ball mills, bubble-cap column, laboratory ware, tower packings, tank linings and acid-proof bricks.

Head Wrightson Processes Ltd.

Stand 4P, ground floor, National Hall

The main exhibit will be a model of the *Dido* heavy water research reactor supplied to the U.K.A.E.A. at Harwell. It has already been supplied to the Australian Atomic Energy Commission and erection is almost complete at Lucas Heights, near Sydney.

In addition to carrying out complete projects the company designs and supplies specialised equipment such as *Counterflo* **cooling towers,** *Fin-Fan* air cooled **heat exchangers,** *Convetube* **furnaces,** *F.P.* pulsation dampeners and *H.W.* heat exchangers.

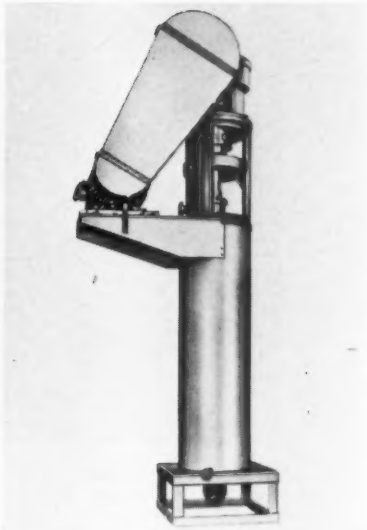
A working scale model and a specially prepared colour and sound film of the Fluor/HWP cooling tower will be shown.

Alfred Herbert Ltd.

Stand 9J, ground floor, Grand Hall

On show will be the Atritor dryer-pulveriser, an air-swept unit mill using the true attrition principle for grinding. Drying and grinding are carried out simultaneously in the machine, obviating the necessity for external dryers. Hot air for drying is provided by a small coke or oil-fired stove adjacent to the mill and drying can be controlled so that the materials can be completely dried or a residue moisture retained, dependent upon requirements.

Grinding can also be controlled by a simple adjustment to the Atritor's internal parts, enabling either a superfine face powder-like or a coarse granulated product to be obtained with various intermediate gradings as required. It is claimed that materials containing up to 80% moisture can be handled and drying efficiencies of 75 to 80% are regularly achieved.



A. Johnson and Co. Ltd. are displaying a water-jacketed unit for the cooling of synthetic resin. This is a special design for very low shaft speed.

Joshua Hindle and Sons Ltd.

Stand 11G, ground floor, Grand Hall.

The most imposing exhibit will be a 24 in. bore split wedge stainless steel flanged gate valve, said to be the largest ever made in this country. With companion flanges and gearing it weighs over a ton and stands nearly 10 ft. high. It is one of a number being supplied to the Shell Chemical Co. Ltd. for their new fertiliser plant at Shell Haven.

There will also be Hindle-Hamer line blind valves, plug valves and visible wedge valves up to 16 in. bore, for positive leakproof shut-off on chemical plants. Sectioned models of the *Fluon*-seated leakproof fullway valve will be on view which visitors will be able to strip, assemble and examine freely.

The Hydronyl Syndicate Ltd.

Stand 2N, ground floor, National Hall.

Tower packings of the Lessing and Raschig types made of materials suitable for use with all kinds and concentrations of chemicals will be on display.

The laboratory worker will find a variety of packings for use in columns of small diameter.

One novelty for small-scale work is Borad double gauze rings, recently developed by the British Oxygen Co. and made by Hydronyl to overcome disadvantages of the earlier types of gauze packing.

Hygrotherm Engineering Ltd.

Stand 1M, ground floor, National Hall

A 1 million B.Th.U/hr. Hygrotherm patented **heat generator,** complete with burner, will be seen. Side panels will be removed to show the radiation and convection sections.

Working models will demonstrate the principles of the new heat transfer system for use at temperatures above 700°F., and of the vapour separation system designed to reduce pump cavitation in high temperature heat transfer systems.

Imperial Chemical Industries Ltd.

Stand 9G, ground floor, Grand Hall

Prominently featured will be examples of the use of **titanium** in chemical plant. Because of its exceptional resistance to a wide variety of aggressive liquids and gases, I.C.I. titanium is now being used increasingly for complete components and as lining material. Products displayed will include large lined vessels and a variety of fabricated products such as valves and valve plates, gas nozzles, agitators, anodising jigs and complete heat exchange units.

Examples of I.C.I. *Kynal* aluminium and aluminium alloy products include fabricated pipework, vessels, heat exchangers and wrought forms such as bus-bar, heat-transfer sheets, structural extrusions, profiled building sheets and treadplate, will also be on view.

Of particular interest to heat-exchange engineers will be I.C.I. *Integron* finned tubing in steel, aluminium and bi-metal, and *tube-in-strip*, I.C.I.'s latest heat-transfer material.

Industrial Descaling Tools Ltd. and H. Williams and Son Ltd.

Stand 28, outer, gallery, Grand Hall

The former company, which is the selling organisation for the latter, will be exhibiting the complete range of *Lark* compressed air and electrically driven **tube cleaners,** with a wide selection of accessories, such as cutter heads, drills, etc.

Both straight and curved tubes from ½ in. to 16 in. i.d. are within the range of *Lark* products. Industrial Descaling is also exhibiting a new design of compressed-air driven surface scaling and chipping machine, suitable for dealing with all types of external surfaces, such as chemical vats, tanker decks, etc.

Isopad Ltd.

Stand 7K, ground floor, Grand Hall

The main exhibit will be what is claimed as the largest electric **surface heater** ever built. Consisting of several rail-mounted sections, the unit is designed for testing 15 ft. high, 60 in. bore valves for nuclear power stations. Isomantles of similar construction for process vessels will be on view. The display will also include Isomantles for drums, both horizontal and vertical, as well as examples from the company's range of laboratory heating mantles. All Isomantles are available in a special version for use in flame-proof areas, and several of these will be seen.

A. Johnson and Co. (London) Ltd.

Stand 3N, ground floor, National Hall

Exhibits will include special purpose Votator equipment, sections of bubble decks, bubble caps and heavy gauge fabricated stainless steel work as well as specimens of light gauge stainless steel spinnings.

Of particular interest to the chemical and petroleum industries are the special purpose Votator scraped surface **heat exchangers** which will be shown for the first time in this country.

Products where straight heating and/or cooling is involved and which have been

successfully handled on Votator equipment are phenolic, formaldehyde, alkyd, melamine, vinyl and wax resins, viscose, rosin, printing ink, asphalt emulsions, photographic emulsions and wax emulsions, linseed oil, lecithin, gelatine and petrolatum. A specialised plant for crystallising paraffin waxes is available. In addition Votator apparatus has been used to advantage in the crystallisation of such materials as paradichlorobenzene, paranitrochlorobenzene, anthracene, naphthalene, acetic anhydride, potassium perchlorate, sodium chlorate, microcrystalline wax, fatty acids and in the winterising of linseed oil.

Johnson, Matthey and Co. Ltd.
Stand 11H, ground floor, Grand Hall

Emphasis will be on the applications of **platinum** and its alloys in chemical processes.

Almost all nitric acid is produced by the oxidation of ammonia by means of a platinum or rhodium-platinum alloy gauze catalyst. The Andrussow process for the manufacture of hydrogen cyanide utilises similar gauzes for the catalytic combination of methane, ammonia and air.

JMC platinum catalyst gauze nets, available in sizes up to 3 metres in diam. will be on show.

Supported platinum and palladium catalysts on a variety of bases, including silica gel, alumina and asbestos, will be displayed, also silver in crystalline and gauze forms as supplied for the production by catalysis of formaldehyde and other aldehydes.

George Kent Ltd.
Stand 10G, ground floor, Grand Hall

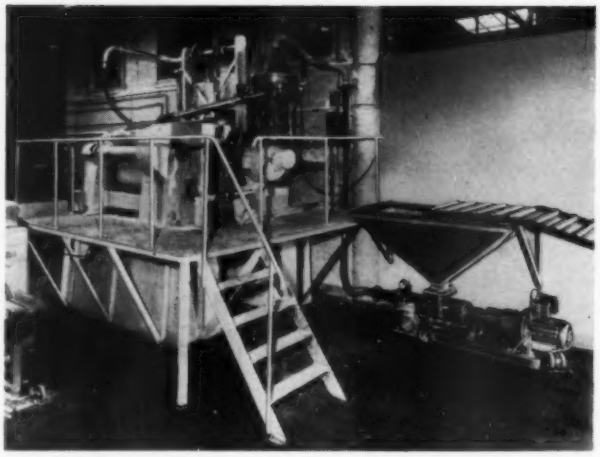
The greater part of this stand will be devoted to the *Commander* range of instrumentation. One section will give a practical demonstration of the interchangeability of the standardised units and assemblies from which this vast range of instruments is built up.

The **quality-control** section of the display will include the new Kent miniature *p*H primary element which will be shown working as a tank unit with a single-point *Universal* *p*H recorder. Other primary elements on view will be cells for the conductivity measurement of H_2SO_4, and gas analysers for SO_2 and CO_2 measurement.

A U-tube comparison unit will show visually the pressure-recovery during flow measurement of Venturi tubes, *Dall* tubes, normal flow orifices, and the new *Dall* orifice. A 6 in. *Dall* tube is to be seen separately.

Kestner Evaporator and Engineering Co. Ltd.
Stand 10E, ground floor, Grand Hall

A variety of chemical and allied plant will occupy a total superficial area of 1,400 sq. ft. Some will be in operation. It will include climbing film **evaporators** for the concentration of spent acid liquors, and for the concentration of heat-sensitive materials: isoductive **heated kettles**: a Keebush **gas washer**; and a laboratory Kestner-Johnson **nitrate plant** in operation. Also in operation will be a laboratory **spray dryer**: a selection of stirrers; a Keebush tank, pump and pipeline in operation; a selection of tantiron and Keebush **acid pumps**, pipes and fittings; a 36 in. dia. axial flow fan in Keebush in operation; and a wide selection of metal parts pickled in Kestner pickling plant.



The P12 Mono powder pump installed at Evans Medical Supplies Ltd. for pumping kaolin to their production plant. The pump handles 10 cwt./hr., discharging through a 10 ft. vertical run of 12 in. bore rubber hose.

Richard Klinger Ltd.
Stand 1C, ground floor, Grand Hall

On show will be an electro-hydraulic power package unit which operates valves in any remote location and at any distance from the control point. It is the latest addition to the company's range of **automatic valve equipment**. The unit operates Klingermatic piston valves of from 2½ in. to 8 in. and might be used for other valves of suitable construction.

Manesty Machines Ltd.
Stand 12G, ground floor, Grand Hall

The *DryCota* combined **tabletting and compression coating** machine incorporating new features is being shown for the first time in Great Britain. By means of a new device, which can be fitted to new or existing machines, pre-made cores can now be coated. This new device utilises the same type of transfer mechanism as on the *DryCota* and it also allows the same positive checking devices to be incorporated in the event of a tablet being made without a core. Such a tablet would be immediately rejected.

A second new feature is that shaped tablets, *i.e.* capsule shapes and shapes other than round, can also be coated on this machine.

The third development is in increased outputs. The *DryCota* can now produce from 500 to 900 coated tablets per min. according to type of machine selected.

Two new tablet machines will be on show. A double rotary tablet machine incorporating 39 pairs of punches, and the new heavy single stroke machine, the 357 which can be used for tablets up to 2¼ in. in diam. Multiple punches and dies can be fitted for smaller diameter tablets. The machine can exert a total pressure of 35 tons and is driven by a 3 h.p. motor with a 3/1 variable speed drive.

Metal Propellers Ltd.
Stand 11C, ground floor, Grand Hall

Exhibits will illustrate a wide range of plant in stainless steel and other corrosion and heat resisting alloys for the petroleum refinery and chemical industries. Photographs will illustrate a number of complete plants recently engineered and manufactured from flow data.

A 10 ft. diam. Glitsch bubble tray in stainless steel for Trinidad, and a 3 ft. diam. Turbogrid tray in Corronel B for Associated Ethyl Co. Ltd., will be the main distillation tray exhibits.

Examples of 2,000 sq. ft. and 75 sq. ft. heat surface stainless steel heat exchangers have been selected for show from a number in course of manufacture.

Jacketed reaction vessels shown will include vessels of 50 gal., 190 gal. and 350 gal. capacity in stainless steel and nickel.

Meynell and Sons Ltd.
Stand 38, outer, gallery, Grand Hall

Exhibits will include gunmetal **valves**, plug cocks, etc., and a variety of specialised fittings. Larger sizes of the steam/water mixing valve will be on view for the first time. These are comparatively noiseless running at a relatively low cost. The *Rayon-Patent* stop valve controls the flow of almost any fluid and gas up to a maximum temperature of 100°C.

L. A. Mitchell Ltd.
Stand 8C, ground floor, Grand Hall

A wide range of liquid **mixers**, industrial **dryers** and corrosive liquid **pumps** will be displayed. In the chemical process equipment field there will be a selection of grease kettles, esterification reaction kettles, air flotation effluent treatment plants and bulk storage installations for chemical liquids and solutions.

Mitchell dryers are extensively used for the drying of solid petroleum chemical products either in intermittent drying stoves and cabinets or continuously in a variety of designs of equipment most suited to dealing with the material. Materials dried include catalysts used in petroleum refining processes.

Mitchell Centrifugal Pumps manufactured in corrosion resisting corundum body find wide application in the petroleum chemical industry as they are resistant to all acids other than hydrofluoric acid and have a high resistance to thermal shock.

Mono Pumps Ltd.

Stand 1Q, ground floor, National Hall

The application of the Mono pump to the chemical industry is to be demonstrated by working units. The principle embodied in the **pump** will be shown by a sectionalised pump working on the stand. A pump handling solids in suspension will be included.

Another demonstration will show the new K63 Kwikleen Mono pump handling a chemical emulsion. Recently included in the Mono Pump range, it is designed for handling pharmaceutical products where a high degree of hygiene is required. A range of standard chemical pumps will also be displayed.

The P12 **powder pump** can also be seen, and within the limits of the stand a demonstration will show the pump discharging powder through a circuit of piping. The pump enlists the aid of air injection to fluidise the powder. The air is not used to blow the powder through the pipeline but only to ensure the powder behaves in a similar manner to fluid. Consequently the use of air is kept within very low limits and therefore it avoids the difficulty of separating air from the end product.

Moritz Chemical Engineering Co. Ltd.

Stand 15, inner, gallery, National Hall

Among the exhibits on this stand will be a turbo-dispenser, a powder mixer, a portable turbo-stirrer in a vessel, a portable turbo-reactor, colloid mills, and laboratory stirrers with various separate stirrer heads.

Murex Ltd.

Stand 9P, ground floor, National Hall

This stand will be devoted to items fabricated in pure tungsten, molybdenum, tantalum, niobium and zirconium. They include tantalum absorption columns for hydrochloric acid. Also demonstrated will be a high-temperature vacuum furnace having tungsten heater element and molybdenum radiation screens.

Powell Duffryn Carbon Products Ltd.

Stand 3O, ground floor, National Hall

Here will be seen examples of Delanium **graphite heat exchange equipment** together with other plant in which graphite is utilised as a material of construction.

The largest standard heat exchanger on the stand will be one which provides 200 sq. ft. of heat exchange surface and is in the form of a graphite block 6 ft. long. This unit is offered with either 9 mm. or 30 mm. process liquor holes according to duty. The smallest unit displayed will be one of only 4 sq. ft. heat transfer area.

A working exhibit will demonstrate the leading features of Delanium graphite **bursting discs.** These cover bursting pressures of from 1 p.s.i.g. to 75 p.s.i.g. and in sizes for 2 in., 3 in., 4 in. and 6 in. bores.

Premier Colloid Mills Ltd.

Stand 4C, ground floor, Grand Hall

Processes in which this company specialise are emulsification, dispersion and mixing. Their range of **mills** will cover units specially designed for emulsion work, more viscous products such as pastes and a further range for handling all types of dispersions. These include the new 3 in. and 6 in. dispersion mills.

Also on view will be a completely self-contained plant for the **homogenising and milling** of grease or similar materials.

Premier now have a complete range of **mixers** which will handle quantities from 1 gal. to more than 30,000 gal. A prototype of **continuous mixing unit** will be displayed. Its advantage is that the mixing throughput can be many thousands of gal. per hr., while the unit to cope with such an output is extremely small as compared with the usual tanks and mixer arrangements.

Power-Gas Group

Stand 3K, ground floor, Grand Hall

The Group is represented by the Power-Gas Corporation Ltd., Ashmore, Benson, Pease and Co., and Rose, Downs and Thompson Ltd. A working model of a **crystalliser,** employing controlled crystallisation by the Krystal process, will be on view, with samples of 35 different chemicals which have been crystallised in Krystal apparatus. This apparatus is being used in the manufacture of chemicals for plastics, fertilizers, explosives, nuclear energy, sugar refining etc.

Also shown will be samples of **catalyst** used in CO conversion and methanation plants and in Hercules reforming plant. **Filter cloth,** in the Favorit filter process for the recovery of dust and fume in industrial process, and glycerin from glycerin recovery plant, complete the samples and specimens displayed.

The two processes to be illustrated are a Hercules **reforming** plant for processing industrial hydrocarbons to produce a variety of products including pure hydrogen, synthesis gases and fuel gases, and the Texaco **partial oxidation** process, by which carbon monoxide and hydrogen are produced from a wide range of feedstocks, including heavy oils, refinery gases and natural gas.

Rose, Downs and Thompson Ltd. are displaying the latest addition to their range of **expellers,** the *D* type Maxoil-Duplex, fitted with a four-stage continuous cooking kettle. This machine incorporates a number of new and patented features, and whilst it is designed for the expelling of almost all commercial oil seeds, it has a particular application for the softer seeds such as decorticated cottonseed and linseed. The complete range of single and twin screw, high and low pressure expellers will be illustrated by models and photographs.

Pyrene Co. Ltd.

Stand 18, outer, gallery, Grand Hall

Fire protection equipment will be displayed in the form of actual appliances, models and photographs. The number and size of mechanical foam generators or foam-making branchpipes varies with the diameter of the tanks and area to be protected; one tank with a diameter of 100 ft., for instance, would require four

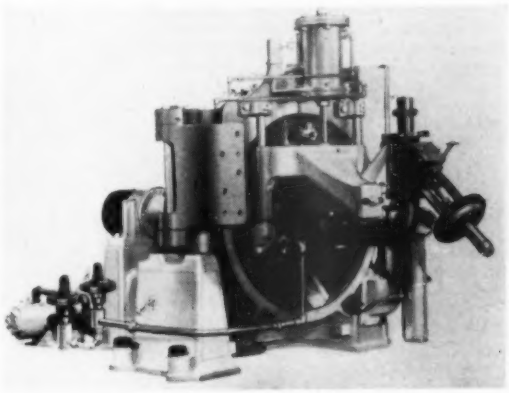
See us at the Show

Visit Stand 33, Outer Row, Gallery, Grand Hall

"Manufacturing Chemist" and the other Leonard Hill Technical Journals covering the chemical and process engineering industries will be on display on the above stand. It is being organised under the ægis of *Chemical and Process Engineering*. You are cordially invited to visit the Stand to see us and examine these fine journals:

Manufacturing Chemist
Chemical and Process Engineering
Petroleum
Paint Manufacture
Food Manufacture
Atomics
Automation Progress
Corrosion Technology
Building Materials
Fibres
Dairy Engineering
World Crops

You will also be able to see and purchase the many Leonard Hill books in the chemical and allied field, including the "Proceedings of the Corrosion Convention," "Food Industries Manual," "A Dictionary of Dairying," "Varnish Constituents," "Varnish Manufacture and Plant," "Modern Cosmeticology," "Margarine and other Food Fats," etc. Full details will be available of forthcoming books including "Chemical Engineering Data Book," "Printing Ink Technology" and "Cathodic Protection."



A hinged opening front cover is a feature of the new Sharples C 41 Super-D-hydrator.

No. 20 foam-making branchpipes, producing a foam output of 6,400 gal.

A convenient means of applying mechanical foam to oil storage installations is provided by *Pyrene* mechanical foam tenders. These vehicles produce varying foam outputs, the largest being 180,000 gal. at the rate of 10,000 gal./min. without replenishment of the foam compound tank. Also available are smaller mobile units, including mechanical foam trailer units, dry chemical trolley units and self-contained chemical and mechanical foam engines of 30-gal. capacity.

Q.V.F. Ltd.

Stand 7Q, ground floor, National Hall

A comprehensive range of industrial **plant in glass** will include four items not previously shown. One of these, RD57/B4, provides a simple means of carrying out reaction under reflux followed by straight distillation. A general purpose overhead arrangement essentially for carrying out reactions under reflux followed by straight distillation, such as solvent removal, is unit RD57/C4. There will be two **distillation** units, one of which, the RD57/D6, is overhead equipment. Also on display will be *Armourplate* glass tanks and Vibro agitators.

Saunders Valve Co. Ltd.

Stand 17K, ground floor, Grand Hall

The two main **diaphragm valve** types—*A*, the full-bore weir type and *KB*, the straight bore type, will be shown in juxtaposition so that their respective merits for particular duties can be assessed. Both types are supplied for screwed and flanged connections (*A*: ¼ in.-3 in. screwed, ½ in.-14 in. flanged; *KB*: ¼ in.-3 in. screwed, ½ in.-10 in. flanged.) The type *M* spherical plug valve can be supplied in an extended range of sizes and the latest 3 in. model may be inspected.

Valves in non-ferrous metal and plastics will be shown together with examples of valve bodies lined with rubber, glass and other special materials used for handling chemicals, abrasive fluids, etc.

Sharples Centrifuges Ltd.

Stand 9H, ground floor, Grand Hall

Models will be shown of the super-D-hydrator, a completely automatic continuous centrifuge of the perforated basket type. It is suited to separating, washing and dehydrating slurries of crystals and lends itself to all types of crystal dehydration operations.

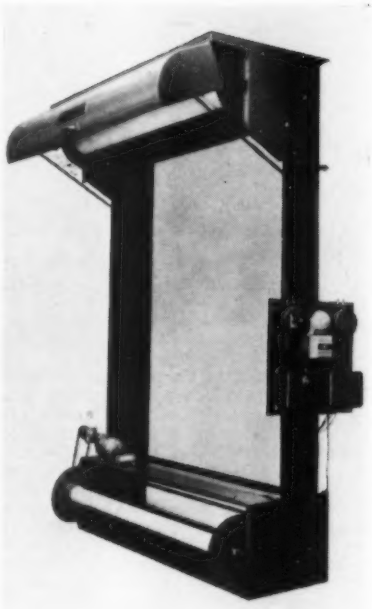
The new C41 super-D-hydrator extends the capacity range upwards, whilst maintaining the characteristic high centrifugal force. Models are available for open or enclosed operation, for washing at elevated temperatures, and under refrigerated conditions. Special units are built for handling sterile or toxic materials.

Several new features have been introduced into the range.

Sigmund Pumps Ltd.

Stand 6A, ground floor, Grand Hall

The demands of most phases of chemical manufacture are met by the wide selection of **pumps** made by this company. They include the B-N stainless steel pump, the A-N heavy duty pump, the WA-N pump, and HO-N pump. The exhibit will also include sectional illustrations of the various other types, such as the two-stage and multi-stage pumps, vertically and horizontally split designs.



The Vokes Autoroll, automatic or manually operated air filter has high dust collection and retention characteristics.

Silverson Machines (Sales) Ltd.

Stand 27, outer, gallery, Grand Hall

This firm is exhibiting a new immersion type **ball mill.** This machine is different from the old-fashioned ball or roller mill; the principle is that the materials are sucked into a working track, and all powders and pigments are ground to a fine impalpable texture by a number of stainless steel balls. It is claimed that manufacturing time is reduced by 20%.

Simmons and Hawker Ltd.

Stand 11F, ground floor, Grand Hall

This firm produces pipework in all shapes and sizes including vessels and heat exchangers for the chemical industry. Many new products will be on view.

United Steel Companies Ltd.

Stand 4N, Grand floor National Hall

Silver Fox **stainless steel** will be represented in a variety of applications, including a half-coil jacketed vessel, a miniature Rosenblad heat exchanger and a Calandria. Samuel Fox and Co. Ltd., a United Steel subsidiary, have pioneered the development of stainless steel curtain walling in this country—the first buildings in Britain with stainless curtain walls are at their Stocksbridge works—and one entire wall of the exhibition stand will be constructed in this material.

Forged steel rings made by the company's Steel, Peech and Tozer branch are being shown, together with a forged tube round as supplied to the tube makers for the manufacture of cracker tubes for oil refineries.

Vokes Ltd. and Vokes Genspring Ltd.

Stand 4Q, ground floor, National Hall

The latest developments in Vokes **filtration** equipment are the "absolute" types, used in the pharmaceutical and biological industries. Features include high dust retention efficiency with very low restriction characteristics.

Two outstanding Vokes filters to be shown are the Autoroll, an automatic screen type air filter, simple in construction, yet with high dust collection and retention characteristics, now available with manual operation, and the S.C. rotary screen with special type filter element which has been developed to meet the need for bulk air filtration, with minimum maintenance and very high dust holding capacities.

Vokes Genspring Ltd. will feature their new *M* range constant support hanger which finds applications where piping in industry requires careful control of stresses and strains.

Worthington-Simpson Ltd.

Stand 7O, ground floor, National Hall

Of special chemical interest will be a new **flame-proof pump** of *Monobloc* construction. Another new feature will be a pump constructed in Hastelloy *B*—the latest addition to this range of chemical pumps. Maximum capacities of pumps exhibited will be 675 g.p.m., with heads up to 130 ft.

Compressor exhibits include one of *Monobloc* construction and a recently introduced oil-cooled rotary.

Wynn (Valves) Ltd.

Stand 12K, Ground floor, Grand Hall

Two air operated **valves** will be shown in operation. Both will be 2 in. size, one of the air-opening, spring-closing type, the other of the spring-opening, air-closing type. Three new model 6 in. valves will be presented, one in cast iron and with position indicator, another in cast iron with glass lined body and with double acting air cylinder operation, and a third, in cast iron with ebonite lined body.

Yorkshire Imperial Metals Ltd.

Stand 5E, ground floor, Grand Hall

Among the exhibits being shown are solid drawn **tubes** for process heat exchangers, coolers, condensers, feed water heaters, fresh water evaporating plant and other tubular **heat exchange equipment** in a wide range of special non-ferrous alloys to British Standard and A.S.T.M. specifications.

Zwicky Ltd.

Stand 2S, ground floor, National Hall

A range of single and dual gauze **filters** will be seen, as well as hand pumps and trigger-operated nozzles. New products include a candle type **micron filter** with a degree of filtration down to one micron. The replacement candles are said to be inexpensive, and easily and quickly fitted.

READER SERVICE

For further information on the exhibits described please use the coupon on page 268.

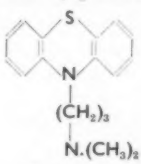
THERAPEUTICS

Analgesics and sedatives • Convulsants • Relaxants
Anorexiants • Atherosclerosis • Penicillinase • Anæsthetics
Anti-radiation drugs • Nor-adrenaline • Mydriatics
Fungistatics • Anticoagulants

By S. J. Hopkins, F.P.S.

Analgesics and sedatives

ADEQUATE analgesia and sedation are essential adjuncts in the management of labour, and with the advent of the new tranquillising drugs it was hoped to provide a higher degree of neuromuscular relaxation. Thus the drugs of the chlorpromazine group produce a condition sometimes known as narcobiosis, as they inhibit some of the metabolic functions of the brain. This change in subcortical function is distinguished from true narcotic action, as the intensity of response to abnormal stimuli is reduced without a depression of the mental faculties. In labour, a drug that could reduce emotional responses to pain and tension, and at the same time produce an adequate degree of neuromuscular relaxation, would be most useful. Much was hoped from chloropromazine, but the precipitous fall in blood-pressure that it may initiate is a considerable disadvantage. Recently, Kuntze and Sison,[1] in an interesting paper, have described the obstetric value of promazine (Sparine). From

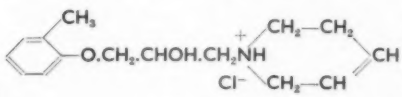


Promazine

their experiences with 100 cases, they conclude that promazine has an adequate relaxant effect on the lower uterine segment and cervix, and can fill the accepted criteria for adjuvant treatment in obstetrics.

Reference has already been made to the remarkable analgesic R815, (MANUFACTURING CHEMIST, July, 1957) and further reports on its comparative analgesic potency and development of tolerance have now appeared (Janssen and Jageneau[2]), based on work with animals. The results confirm that R875 is several times more active than morphine, pethidine or methadone, and has a faster onset of action, and a slower development of tolerance. It was suggested at one time that R875 was not habit-forming, but Eddy,[3] reporting tests on the drug at the Addiction Research Centre, concludes that it is at least as habit-forming as morphine, and it is now under the provisional control of the U.S. Commission on Narcotic Drugs.

The synthesis of a number of intermediates required for a search for a mild analgesic free from the disadvantages of existing drugs have been described by Beasley *et al.*[4] Aryloxypropanolamines were first selected for study, and subsequently the work was extended by David *et al.*[5] to certain piperideine derivatives Of more than 50 compounds selected for further study, the most effective compound was 1-Δ^3-piperideino-3-o-toloxypropan-2-o1 hydrochloride, also known as Tolpronine. This



Tolpronine

substance has marked analgesic properties, and is effective both orally and by injection. It has a wide margin of safety, and compares with codeine, but is less constipating. It also has some local anaesthetic properties, which is perhaps not very surprising in view of the structural similarities to piperocaine and mephenesin.

A study of analgesic drugs has also been carried out by Keats *et al.*[6] with particular reference to dihydrocodeine. This compound was first discovered in 1911, and was subsequently used as an antitussive. More than a decade later the analgesic properties were discovered, but the drug never achieved any great popularity. Gravenstein *et al.*[7] re-investigated the properties of the drug, and their work indicated that 30 mg., given by subcutaneous injection, produced an analgesic effect comparable to that of 10mg. of morphine. Keats confirmed this work, and found that a dose of 30 mg. resulted in a high incidence of analgesia, with few subjective effects. With higher doses, the effects were comparable with those of morphine, but further increases in dose up to 90 mg. did not produce any great response. With these higher doses the respiratory and subjective effects of morphine were experienced, indicating that the optimal dose had been exceeded. The authors consider that dihydrocodeine is not an analgesic comparable with morphine, but that it should be regarded as a codeine of increased potency. The clinical value of such a drug will depend on a realisation of its limitations. If adequate analgesia is not produced, the dose should not be increased, as the absence of response indicates that a more potent drug is necessary.

Further work on the dose-relationships of primidone and phenobarbitone has been published by Gruber *et al.*[8] By substituting each drug by the other at weekly intervals, and observing the frequency and type of seizure in patients with known epilepsy or focal brain damage, these workers came to the conclusion that 250 mg. of primidone is comparable in effect to 50 mg. of phenobarbitone. From this work it was considered that when given together the effects of the drug were additional, as no potentiation of effect was observed.

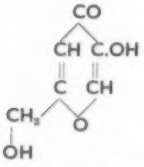
Convulsant drugs

During a pharmacological study of fluorinated ethers of low molecular weight, Krantz and Truill[9] found anaesthetic properties in tri-fluoro-ethyl-vinyl ether. This suggested that associated compounds might repay further investigation. No anaesthetic effects could be found in the fluorodiethyl ether, and the hexafluorodiethyl com-

$CF_3.CH_2.O.CH_2.CF_3$

pound unexpectedly produced violent convulsions. In rats, concentrations of the new derivative as low as 30 p.p.m. caused marked clonic and tonic seizures, which ceased promptly as soon as the substance was removed from the inspired air. No ill-effects could be detected even after repeated inhalations, and the convulsions were easily prevented by pentothal, ether, and tri-fluoro-ethyl-vinyl ether, but not by mephenesin.

The apparent harmlessness of repeated exposure to this hexafluoro-diethyl ether, the ease with which depth and duration of the seizures could be controlled, and the general similarity to leptazol (pentylentetrazol) suggested its use in mental patients. It was given in doses of 1-3 c.c., inhaled from an ordinary nasal inhaler of the type used for decongestants. Convulsions occurred in 1-3 min. and lasted 2-4 min. and the seizure resembled that produced by electric shock methods. Recovery was uneventful. The authors consider that the drug may be useful in the treatment of certain types of mental illness. It is also of some

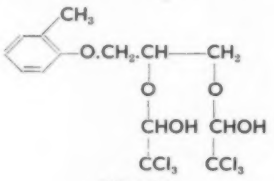


Kojic acid

interest to note that kojic acid (obtained by culturing certain bacteria in carbohydrate solutions) has been found by Werch *et al.*[10] to produce convulsions in animals, and weight for weight it is much less toxic than leptazol.

Relaxants

Girerd *et al.*[11] have examined several semi-acetals for anticonvulsant activity, principally against the toxic effects of strychnine, picrotoxin and pentylentetrazol (leptazol). The most effective compounds were 1-1'[(3-0-tolyloxy propylene)dioxy] bis -2-2-2- trichloroethanel (NC 1318) and the

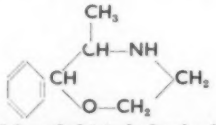


NC 1318

corresponding phenoxy compound (NC1428). These compounds show chemical relationships with both mephenesin and chloral hydrate and have anticonvulsant and relaxant properties. Some anomalous results were found with analogous compounds; thus the 2-2-2- trichloro-1[1-ethyl-1-methyl-(-2-propyne -1-oxy)-ethanol] antagonised the action of picrotoxin and leptazol, but enhanced the effect of strychnine. The clinical value of these compounds has still to be assessed.

Anorexiant

A number of anorexiant drugs derived from sympathomimetic compounds have been introduced from time to time such as amphetamine and dexamphetamine. For some patients the cardiovascular and CNS stimulant actions of these drugs are too disturbing, but in a new compound examined by Ressler[12] these side effects are much reduced. Originally synthesised by Thoma and Wick,[13] this compound is described as



2-Phenyl-3-methyl-tetrahydro-1 : 4-oxazine

2 - phenyl - 3 - methyl - tetrahydro-1:4-oxazine. Using a double-blind technique with 30 obese patients, Ressler found they all lost on average about 15 lb., without any stress on diet, and the incidence of side-reactions and subjective complaints was negligible. The compound appears to be an effective appetite depressor suitable for routine therapy.

Atherosclerosis

Considerable interest is now being taken in the possible relationships between dietary food, blood cholesterol and atherosclerotic disease. Nicotinic acid has some influence on blood cholesterol levels, and Parsons and Flynn[14] in a useful paper have attempted to evaluate the effects of the drug, the most suitable dose, and the relative value of nicotinamide. The patients selected for treatment had blood-cholesterol values higher than 270 mg./100 c.c., and nicotinic acid was given in doses of 3 g. daily in divided doses. The acid is best given after food to minimise side-effects. This regimen was continued for 12 weeks, and if by that time the blood cholesterol had fallen below 250 mg./100 c.c., daily maintenance doses of 1·5 g. were given. If the 3 g. dose was not effective the daily dose was increased to 6 g. Throughout the test the patients were urged to continue on their standard diet, so that as far as possible only one variable factor was operating.

Some side reactions due to the vasodilator action of the nicotinic acid were to be expected. These appear to be related to the size of the meal previously taken, but the severity and frequency of these reactions tended to subside after a few days. Of the patients treated, 50-70% required high doses (4·5-6 g. daily), and continuous and prolonged therapy is essential. The administration of nicotinamide or a placebo resulted in a rapid return to the pre-treatment blood-cholesterol levels. The mechanism of the action is obscure but from the practical point of view nicotinic acid appears to be the most effective treatment yet available.

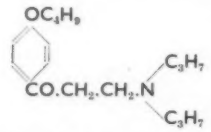
Penicillin reactions

Penicillinase is produced by many strains of bacteria, including the staphylococci and *Bacillus coli*, and is one cause of the loss of activity shown by penicillin solutions that have become contaminated with bacteria. It is thought to act by hydrolysing penicillin to penicilloic acid. Becker[15] found that a single dose of penicillinase (100,000-800,000 units), given by intramuscular injection, could reduce the penicillin blood-level to zero within an hour, and keep it so for four to seven days. No penicillin could be detected in the blood in spite of continued injections. This fact has been exploited by Minno and Davis[16]

for the treatment of penicillin reactions. In a series of 42 cases, relief of fever, urticaria, pruritus and arthralgia was obtained without difficulty, although there was some variation in the rapidity of the response.

Local anæsthetics

A varying degree of local anæsthetic power is found in a wide range of substances quite apart from the derivatives of *p*-aminobenzoic acid. Thus the local anæsthetic effects of propiophenone were first noted by Mannich[17] but many of its derivatives, although highly active as local anæsthetics, were poorly tolerated, and so were of little therapeutic value. More recently Celadnik *et al.*[18] have investigated a number of substituted propiophenone compounds, and found a high degree of local anæsthetic activity. The most active compound examined was



m-Butoxyphenyl-β-(N-piperidyl)-ethylketone

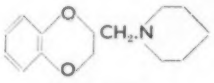
m-butoxyphenyl-β-(N-piperidyl)-ethylketone, which as a surface anæsthetic was ten times as active as cocaine. The most generally effective compound, combining high activity with low toxicity, was *p*-butoxyphenyl-*p*-dibutylaminoethylketone. The butoxy radical plays a significant part, as all activity was lost if this group was replaced by a nitro group.

Irradiation sickness

The treatment of irradiation sickness is one of the most intractable problems of radiotherapeutics, and it still remains largely unsolved. Stoll[19] has attempted to reassess the reality of the problem by a controlled trial with a number of drugs, including pyridoxine, chlorpromazine, cyclyzine and pacatal. In previous tests pyridoxine was found very effective, and this favourable impression was confirmed. A difference was noticed in the response of patients to various drugs. In ambulant patients pacatal was considered to be more effective than cyclizine, and in some cases lactose tablets, used as an inert control, proved surprisingly effective. The varying symptoms of radiation sickness were relieved in varying degrees, but vomiting appeared to be the easiest symptom to control. No drug exhibited a statistically significant degree of superiority over any other, and the most effective treatment for this distressing accompaniment of radiotherapy still awaits discovery.

Nor-adrenaline

This compound is now widely employed in therapeutics, mainly in the treatment of shock, in surgery and in myocardial infarction. The drug is invariably given intravenously, and very great care must be taken to avoid extra-venous injection, as otherwise an intense local ischæmia is caused, which may even lead to necrosis. Even when there is no obvious local infiltration of the solution, and the injection needle is still firmly in the vein, coldness, pallor and numbness of the tissues sometimes occur, and this disadvantage tends to limit the usefulness of the drug.



Piperoxane

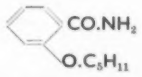
As a physiological antidote phentolamine has much to recommend it, but hyaluronidase is contra-indicated, as by its spreading action it may increase the size of the damaged area. Pelner[20] has found piperoxane to be an effective remedy. This adrenolytic compound was employed as a 0·025% solution, and multiple injections of 0·25-0·5 c.c. were made subcutaneously into the ischæmic area along and about the affected vein. Within 30 sec. the injected area recovered a normal colour, and no ischæmic damage occurred.

Mydriatics

A wide range of drugs is employed in ophthalmology as mydriatics and cycloplegics, but little comparative data are available. Barbee *et al.*[21] have examined a number of drugs from this point of view, using a double-blind technique in a number of normal subjects. They used normal saline, phenylephrine 10%, ephedrine 3%, hyoscine 0·2%, cyclopentolate 1%, atropine 1%, homatropine 4% and hydroxyamphetamine 1%. The patients selected included those with blue eyes, brown eyes, and negroes with dark eyes, and in all three groups hyoscine, atropine and homatropine produced the greatest and most uniform degree of mydriasis. Cyclopentolate was less satisfactory in negroes, and ephedrine was ineffective. Homatropine exhibited no significant cycloplegic effects in negroes, but in all three groups the greatest and most satisfactory cycloplegic effects were produced by atropine and hyoscine.

Antifungal agents

The treatment of fungal diseases is one of the less spectacular aspects of medicine, and the variety of drugs used for such conditions is an indication of the degree of unsatisfactory response. A new group of potentially useful compounds has been described by Coates *et al.*,[22] and their discovery springs from a search for new analgesics related to salicylamide. During the routine screening of various derivatives it was



2-n-Amyloxybenzamide

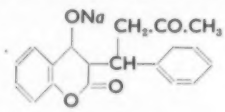
observed that 2-*n*-amyloxybenzamide and 2-*n*-hexyloxybenzamide had interesting fungistatic properties. Further investigations were made with these and other derivatives, and the paper gives details of synthesis. The compounds were dissolved in a solvent containing alcohol (70–), propylene glycol (5) and water (25), and assayed for fungistatic and fungicidal activity by the methods of Schamberg[23] and Golden.[24] In the 2-alkoxybenzamides a considerable degree of structural specificity was found. Maximum activity occurs in the *n*-amyloxy and the *n*-hexyloxy derivatives. This activity is reduced if the alkyl substituent is branched, and disappears if the chain is lengthened to the octyl compound. Activity was not increased by halogenisation, and the phenoxyacetic acid derivatives, although exhibiting certain relationships with known fungicides, did not show any significant degree of activity. A comparison of the fungistatic properties of these new compounds with those in current use showed that 2-*n*-amyloxybenzamide was more active than undecylenic acid,

salicylanilide, nystatin, phenylmercuric acetate, 8-hydroxyquinoline and others. The compound appears to be effective against many dermatophytes responsible for human mycotic infections, and further investigations are in progress.

Anticoagulants

In the 15 years since the introduction of dicoumarol, many attempts have been made to find a more satisfactory compound, in particular one permitting a greater degree of control. The compounds now available are derived either from coumarin or indandione, and each derivative, although much more satisfactory than dicoumarol, has some disadvantages. More recently, Shapiro and Ciferri,[25] and Fremont and Jagendorff[26] have described clinical results obtained with a new synthetic anti-coagulant derived from coumarol. (See also Progress Report, March 1957).

The new compound, coumadin sodium or Warfarin, has structural



Warfarin

relationships to dicoumarol, and preliminary clinical experience indicates that it comes nearer to filling the essential criteria of a satisfactory anticoagulant than any other compound yet available. The new derivative is water-soluble, and can be given by intramuscular or intravenous injection. A single intramuscular injection of 75 mg. gives a hypoprothrombinæmic response extending over five days, with a peak effect on the 2nd-3rd day. Patients were maintained easily on doses of 5-15 mg. daily, and the response is regular and consistent. Any excessive response is easily controlled by vitamin K_1. The new compound promises to be useful for both initial and extended anti-coagulant therapy.

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FERTILISERS and Plant Nutrients

Fertiliser costs • Chemicals v. humus • Advances in manufacturing techniques • Gibberellic acid test results

By D. P. Hopkins, B.SC., F.R.I.C.

Fertilisers and irrigation

WATER supply, even in a comparatively humid country, can be a major limiting factor to plant growth. Irrigation is the age-old answer in arid areas, and it is now increasingly employed to raise crop yields in non-arid areas, *e.g.* overhead irrigation for market garden crops in the U.K. If the extra water provided by irrigation leads to extra growth, is an extra supply of fertiliser also needed? Or is the same amount of fertiliser that would be given for non-irrigated cropping still adequate, *i.e.* more effectively used as a result of the steady supply of water? Two recent papers on grassland irrigation go a long way towards answering these questions.

Grass can be regarded as a difficult " test-crop " for irrigation/fertiliser economics. The plant population per acre is high, giving a considerable water requirement during dry summer periods; but grass is essentially a low-cost crop and expensive methods for raising its output cannot hope to find a practical place in dairying or livestock agriculture.

A British paper[1] reports two years' work irrigating pastures on the bank of the Thames. With irrigation, summer growth of young, leafy grass was continuously obtained and the herd's milk yields were maintained without the usual falling-off at the end of spring growth and without the usual need to provide non-grass summer feed. However, about 5 cwt. of sulphate of ammonia were used per acre per annum in addition to the normal fertiliser supply, which, without irrigation, was 3 cwt. of a compound (NPK) and 2 cwt. of sulphate of ammonia per acre. The actual cost of irrigation was only slightly higher than the cost of the additional fertiliser, thus:

	1956	1957
Acres irrigated	47	50
Irrigation cost per acre (£)	5·0	4·3
Extra fertiliser cost per acre (£)	4·7	3·7

The combined irrigation/fertiliser cost is therefore £8-10 an acre. The results must be worth more than this to justify the investment. Milk output from April to September averaged some 7,000 gal. more in 1956 and 1957 than in the similar months in 1954 and 1955, when the farm concerned did not irrigate this portion of its pastureland. In addition, there was a saving of 5 tons of concentrated feeding stuffs per annum in 1956 and 1957. If the extra summer milk per annum is put at only 5,000 gal., the value of this, plus the saving in

feeding stuffs cost, is £775. At £8-10 an acre expenditure on irrigation and extra fertiliser, the outlay for the acreage treated can be put at £450. Moreover, quality of pasture herbage was improved by irrigation, and the heavy amount of nitrogen used did *not* inhibit clovers. This last point may have a wider significance, *viz.*, if water is adequately present, clover recession through intensive N applications can be much less feared.

A New Zealand contribution[2] is based upon wider and longer experience of grassland irrigation. In that country there are now some 600 to 700 spray irrigation plants on farms, a development that began in 1947. Although this paper summarises some 10 years of research and farm development work by Rukuhia Soil Research Station, it is somewhat less specific than the British paper on the extra fertiliser needs of irrigated grassland. Spring applications of nitrogen failed to give a response, nor were there, on clay loams, any responses to above-normal applications of phosphate. It is felt that the extra nitrogen needs are met by wild white clovers which flourish under irrigated conditions. But as in eight years of summer irrigation an extra output per acre of 6,000 lb. of dry matter has been produced, it is suggested that there must be a cumulative drain upon phosphate and potash, perhaps equivalent annually to 1 cwt. of superphosphate and 1 to 1½ cwt. of muriate of potash per acre. It is therefore recommended that with irrigation it is essential for optimum returns " to maintain a high level of fertility through the appropriate use of fertilisers." Possibly this amounts to no more than a greater need for frequent soil sampling and analysis to check falls in P and K with irrigated grassland. It is interesting that the New Zealand experience centres attention upon extra P and K requirements whilst the British paper deals with extra N.

Chemicals or humus?

Much of the pro-humus, anti-chemical school's earlier faith was based upon Indian experience. An Indian paper[3] has reported well-measured and long-term evidence shattering the view that fertilisers for Indian soils must be accompanied by organic matter in order to prevent extra microbiological consumption of humus. As this view has been held not only by humus school extremists but also by some soil scientists—owing to the low humus reserve of so many Indian soils—the new paper is of greater significance than the usual report of long-term fertiliser effects. Sulphate of ammonia was continuously applied, with and without accompanying farmyard manure, to paddy crops for 10 years. The grain yields were increased significantly by sulphate of ammonia in all years except the last two; straw yield increases were significant in all years. The consolidated results showed that grain and straw yields were increased by sulphate of ammonia, but the grain yield was *not* increased by the effect of farmyard manure; only the straw yield was increased (5%) by the latter. Maximum yield increases were secured from a combination of sulphate of ammonia (30 lb. N per acre) and farmyard manure, but the additional effect of the manure was not economically justified. However, the major finding was that after 10 years of continuous applications of sulphate of ammonia no adverse effect on yield, or upon the composition, hardness and percentage aggregation in the soil, had been observed.

Nevertheless, the importance of organic matter for tropical soils has again been stressed in a paper reporting nitrogen studies in Ghana soils.[4] In the dry season nitrification is partly sterilised, and when rains again commence nitrate is severely lost by leaching and by de-nitrification. It is considered that free-draining tropical soils require greater amounts of organic matter than soils in more temperate regions if they are to retain useful amounts of N, and the low fertility of tropical soils is attributed to failure to build up organic matter reserves.

Farm fertiliser practice

For some years regional-basis surveys of farm fertiliser practices have been carried out in England and Wales, but strangely this kind of enquiry had not been pursued in Scotland. In recent months the first regional surveys of Scottish fertiliser practice have been published,[5] six which were conducted in 1956 and two for 1957. These surveys reveal very different " local " rates for N, P and K applications; to some extent but not wholly these differences are to be explained by local agricultural aims and by variations in exposure to climate. Phosphate rates/acre are well above English rates generally, but the exceptional deficiencies of this plant food in Scottish soils have long been recognised. Each survey has been conducted by one of the three Agricultural Colleges. They cover areas in Wigtownshire, Aberdeenshire, East Lothian, Ayrshire, Caithness and Angus (all 1956), and Aberdeenshire and Dumfrieshire (1957). Reports can be obtained from the respective Colleges or from the Agricultural Research Council's Unit of Statistics, Aberdeen. The reports are exceptionally detailed, with rates of fertiliser use for all major crops and types of grassland, together with data for lime use.

Manufacture

A U.S. Patent[6] deals with the addition to sulphuric acid in superphosphate manufacture of a carbon-substituted alkylbetaine with 10-16 C atoms in the alkyl group. The intensity of acid fumes in the reaction zone produces a superphosphate that may be " cured " in two instead of the usual six weeks, and which tends to have lower moisture content and higher ammonia-absorption capacity.

The American combined ammoniation-granulation processes (see last Report also) have been fundamentally and clearly described,[7] particularly the successful use of coarse potash to obtain better granulation with lower recycle loads. An interesting point is made about mixing efficiency. Mixing efficiency of rotary mixers is said not to be good in comparison with pugmill mixers; the latter, having a much higher power input, possibly 100 h.p. as against 20, are much superior. In the U.S.A. potash is a " mixing offender " for two reasons, (*a*) low solubility rate and non-adhesive nature, (*b*) large amounts used in modern compound formulation. There is a reference to English practice implying that here sulphate of ammonia behaves somewhat similarly.

A Dutch continuous process for calcium nitrate has been described.[8] In fact, fertiliser calcium nitrate is usually a combination of 5 : 1 ratio of calcium and ammonium nitrates, the ammonium salt being added to improve crystallisation. A high-pressure evaporator is divided into compartments and

operated with controlled evaporation, *i.e.* the solution passes through the compartments in a given sequence, causing stepwise rises in concentration and boiling-point. There are four sections and the solution concentration is high (about 95%) only in the fourth; this gives much greater heat-transfer efficiency to the first three sections, and has enabled a continuous process to compete with the usual batch methods of production.

Russian development work to utilise the extensive phosphate deposits of Kara-Tua has been surveyed in an English article[9] and Russian references can also be given[10,11]. A difficultly hygroscopic superphosphate was greatly improved in condition by subsequent ammoniation; although the fresh product tended to cake, it could be roller-milled to a free-flowing state after storage. Nitric acid methods of raw phosphate treatment have been developed. The process now being favoured includes a filtrate treatment with ammonium carbonate or with gaseous ammonia and carbon dioxide. This gives a sludge deposit of Ca and Mg carbonates leaving almost pure ammonium nitrate. (The phosphate has, of course, largely been removed earlier as precipitated dicalcium phosphate.) The industrial development of Kara-Tua deposits is of immense importance to Central Asian agriculture.

Short but well-informed accounts have been published in America about the use of urea-forms in compounds[12] and about the TVA cone-mixer[13] for phosphate rock acidulation. Urea forms as compound ingredients are usually in *powder* mixtures; in granulated compounds the solid urea form has so far been added after the other ingredients have been granulated. It is possible that in the short period of higher temperature during granulation small nitrogen loss could occur by hydrolysis. The main advantage of the TVA cone mixer is low initial cost and low maintenance; however, ease of construction has led some U.S. manufacturers to make cone mixers with unsuitable dimensions, and this has led to criticisms that, in fact, are invalid.

Theory

Prof. Hugh Nicol's revolutionary concepts about fertilisers have already been referred to in these Reports (see MANUFACTURING CHEMIST, 1957, **28**, 560). A further paper presenting his views rather more simply has appeared.[14] Nicols' main point is that for a century or so conventional NPK recommendations have ignored the other ions associated in fertiliser materials with the N, P, or K provided, and these other ions introduced into soils have effects that are grossly under-investigated. Thus there is hardly any scientific literature about the calcium sulphate that is applied when ordinary superphosphate applications are given, although in this century some 300 million tons have thus been added to American and European soils. The principle of ionic balance is explained more clearly for the ordinary reader in this latest paper, but the *p*C concept—claimed to be a far better measure of a soil's state than *p*H—is not explained in detail.

It is possible that this new approach to soil and fertiliser science would attract wider attention if *p*C did not seem even more difficult to visualise in practical equivalence than *p*H. The acceptance of *p*H as a measurement of soil properties required time. "NPK-isolation" in soil-chemical thought is manifestly incorrect, but it has reduced complexity during a long period of developing fertiliser use. In many areas of the world, where fertiliser use is still very low, this simple approach would still seem desirable if fertiliser education is not to be handicapped. But it may well be time to free the NPK outlook from its "isolationism" in countries where fairly high fertiliser rates are already established. The presentation of more practical benefits from applying the ionic balance and *p*C ideas would also stimulate more attention.

Gibberellic acid

Gibberellic acid has no advantage over fertilisers in increasing grass growth except when the effect of fertilisers is slow.[15] Thus, early or late "bite" might be better encouraged than by fertilisers, but the stimulation of growth by the acid is followed by later reductions in yield. The tests with grassland have indicated that gibberellic acid and fertilisers exercise separate effects in raising yields at any particular cut; applied together, fertilisers and the acid have additive effects. Various tests have shown that gibberellic acid stimulates the growth rate of other farm crops, but these spurts are temporary; in no case was final yield increased and in a few cases they were lowered.

The very comprehensive paper by Brook on granulation techniques (see last Report, MANUFACTURING CHEMIST, 1958, **29**, 116) has now been published[16] and copies can no doubt be obtained from The Fertiliser Society, 44 Russell Square, London, W.C.1.

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Multi-Function Relays. In their technical leaflet 1682 Sunvic Controls Ltd. have compiled a series of reports showing some applications of these relays. The reports are based on actual installations.

B.S. 2742C. Ringelmann Chart. This is the British Standard version of the Ringelmann chart by means of which a visual assessment can be made of smoke emission from industrial chimneys. This method has been made the basis of assessing conformity with legislation under the Clean Air Act which becomes fully effective on June 1. The chart published by B.S.I. will provide a standard yardstick for use in connection with the new legislation.

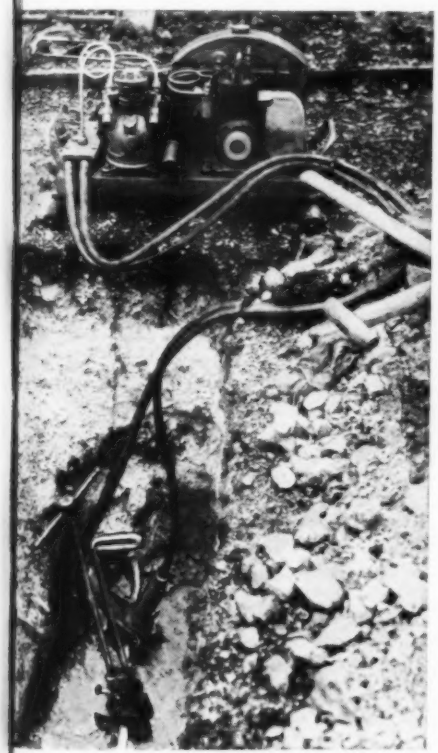
In addition to B.S. 2742C a separate publication, "Notes on the use of the Ringelmann Chart" (B.S. 2742), has been issued which users of the charts will find it useful to have for reference.

Copies of these publications may be obtained from the British Standards Institution, 2 Park St. London, W.1.

PLANT AND EQUIPMENT

Freeze Repair of Water Pipes

The repair and maintenance of pipework by water undertakings, and for industrial premises, generally causes considerable inconvenience because it involves interruption of water supply. There is also the risk from such interruptions of damage to hot water systems and contamination of the supply. It is, therefore, of considerable value if the pipework affected by the necessary stoppage can be reduced to the absolute minimum. Such a device has been produced by which water pipes of various kinds can be repaired by an efficient and ingenious method. It is simply the freezing of the water in the pipe, thus forming an ice plug so that the necessary repairs can be effected. The device is a "Freeze-Seal Unit," consisting of a portable refrigeration set, with a refrigeration compressor driven through a V-rope drawn either by a two-stroke petrol engine or electric motor.



A Freeze Seal unit in operation on lead piping. The closing tool is seen compressing the pipe, and the freezing tool is clipped on the up-stream side.

In operating the unit for lead pipes the pipe is compressed flat by a closing tool being placed close to the burst and arresting the flow of water. Then a controlled drip tool is placed in position on the up-stream side of the closing tool, the centre spindle is screwed down to pierce the pipe to allow a free flow of water under pressure to a drip cork, which is adjusted to allow 20 drips a minute. The freezing tool, fitted with copper bushes suitable for the pipe size, is then placed round the pipe and clipped tightly on the up-stream side of the controlled drip tool.

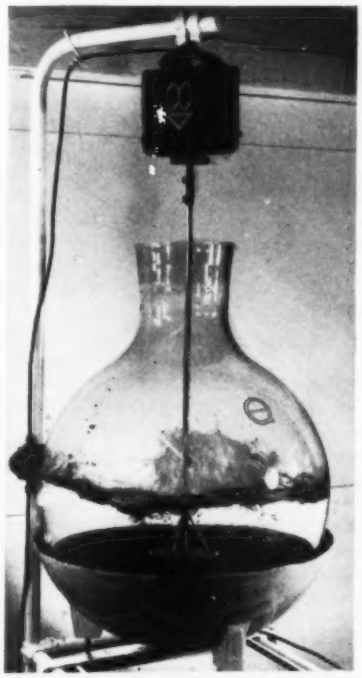
The machine having been started up previously, the freezing tool will be already cold and will start to freeze immediately it is applied and will form an ice plug within the pipe. The drip tool, by allowing an escape of water, ensures that the ice plug is formed freely with a hollow centre of gradually diminishing bore until the final moment of seal. This free formation prevents any expansion of the ice plug which might cause distortion to the pipe under repair.

When the drip ceases to fall from the drip cock it is an indication that the water in the pipe is frozen, and the supply completely sealed off. The repair may now be commenced. On completion of the repair the freezing tool is removed and the ice plug will then thaw out completely in a few minutes.

For pipes other than lead instead of the closing tool and controlled drip tool, quick operating clips incorporating the drip tool are used, which are made to fit various diameter pipes and are lined with rubber. The clips are fitted loosely round the pipe clear of the burst and then slid over and tightened up. This having been effected the cock is adjusted to allow twenty drips a minute.

Users of this equipment have found that road reinstatement charges and water wastage have been reduced to a minimum because of the speed with which repairs can be effected. A perfect seal free from drips is obtained and time and labour are saved. In addition the equipment is useful for locating invisible leaks and obviates the necessity of cutting the pipe for testing or opening long trenches for examination; while it can be used for testing mains and services.

Enquiries for this equipment should be sent to The Editor, "MANUFACTURING CHEMIST."



This Vibro mixer works by fast vertical agitation of horizontal blades.

Vibratory Mixer

Great simplification of liquid mixing problems is offered by the new Vibro mixers introduced for the first time in this country by Q.V.F. Ltd. The Vibros work by extremely rapid vertical agitation of horizontal blades immersed in the liquid. They and the shaft on which they are mounted are of stainless steel.

A two-way switch on the A.C. motor varies the length of stroke and so alters the mixing action.

The range of three mixers—to handle quantities from 10 to 3,000 litres—are important time-savers because they accelerate chemical reactions. There are no rotating parts, no stuffing boxes or mercury seals, and the agitator is totally enclosed.

The Vibro mixer was designed in Switzerland by Dr. Ing. H. Muller.

BOOK REVIEWS

Cosmetics, Science and Technology.

Edited by E. Sagarin. Interscience. Pp. 1,433. *$25 net.*

THIS BOOK marks a new departure in cosmetic publishing. In place of the usual author it has 61 authors, rather more than one per chapter. Sooner or later this had to happen. The practice of covering a subject by a collection of separate monographs, each by a specialist in his particular field, is being applied more and more to all branches of science.

Cosmeticology is not yet wholly a science, but the necessity for a scientific approach to a subject which demands at least a nodding acquaintance with so many different branches of science is now universally appreciated. The mere collection of recipes, many of them meaningless variations on a not very original theme, would get a very cold reception from cosmeticians today. No such criticisms can be levelled against this book. In most cases the formulæ given are adequate but not excessive; indeed in one chapter I felt a few more would have been an improvement. Two formulæ, neither of them original, constitute a very meagre ration for such an important product as lipsticks.

The preface describes how it was decided " to bring together a number of authorities each of whom has acquired a thorough familiarity with some special phase of cosmetics or some related science or technique " and issue their individual contributions as a collective work.

The advantages of this method are many and obvious. The difficulties and disadvantages are perhaps less obvious but nonetheless real, and throw a heavy responsibility on the editors. First the layout of the book and divisions into separate chapters must be fixed and then the authors chosen. Overlapping and repetition are inevitable when so many authors write separate chapters on what are often closely related subjects. This necessitates very careful editing in the final stages.

As one would expect from an editorial board consisting of H. D. Goulden, Emil G. Klarmann, Donald H. Powers and Edward Sagarin, with the last named as Editor-in-Chief, all this had been very well done and the success of which this book is assured is due in no small measure to their efforts. The initial planning of layout and divisions to give a smooth, logical development into a coherent whole may not equal the classical perfection of R. G. Harry's " Modern Cosmeticology," nor could it hope to do so without slavishly copying his model. Any collective work on cosmetics must be something of a patchwork quilt, but a patchwork quilt can serve a very useful purpose if the individual patches are all good patches, properly fitted and well sewn together, though it may not meet with universal approval as a work of art.

The individual authors have been well chosen. Some are recognised authorities of international standing and every one has some claim to be considered as an expert on the subject for which he or she is responsible. The annotated list of contributors reads like an American " Who's Who in Cosmetics." Add to this the list of firms, institutions and individuals to whom the editors acknowledge indebtedness for assistance in various other ways and one realises that this is a collective effort to which virtually the whole American cosmetic industry has contributed something.

English readers may think it strange that a book giving formulæ for powder depilatories, thirty years out of date in this country, should completely ignore the straight stearate vanishing cream, which still commands a large sale over here. It must be remembered that although intended for all English-speaking cosmeticians it is an American book by American writers and largely reflects the demands of the American market which are sometimes, but not invariably, ahead of those current on this side of the Atlantic. Such considerations do not, however, account for the contribution entitled " Emulsification," which could and should have been one of the most informative and useful chapters in this book. The statement made in the opening paragraph, " Although of vital importance, natural and synthetic emulsions were not studied extensively until recently," makes strange reading in a country where emulsions have been the subject of continuous study for well over half a century. It is unfortunate that, in his enthusiasm for the H.L.B. classification, the author has ignored much that has happened and is still happening in emulsion research outside the U.S. The H.L.B. System has useful applications but it is not the beginning and end of emulsion technology, nor are certain proprietary non-ionic emulsifiers necessarily the answer to all emulsification problems.

I found little to criticise and much to admire in the rest of this enormous book. Its sponsors were determined to give an adequate and up-to-date account of both the principles and practice of modern cosmetic and toilet manufacture even if it took them 53 chapters, 1,433 pages and about 2,500 references to do so. The result is a really first-class work of reference which will command a place on our bookshelves for many years to come, alongside the few other standard works on this subject.

The price of any book of this type must be high, and this one is even higher than usual. But it is worth it.

FRANK ATKINS.

Aids to Organic Chemistry

5th Edn. By G. A. Maw. Baillière, Tindall and Cox. 1958. *Pp.* 176. *10s. 6d. net.*

THREE editions of this handy book have been issued in ten years, clear evidence of its popularity. Since it is written expressly for medical students it encourages the belief that our young doctors are more knowledgeable about chemistry than their fathers, which is all to the good in a profession increasingly dominated by chemotherapy.

This new edition has been completely rewritten. It contains no fewer than 36 chapters which take the reader at a brisk pace from the structure of the carbon atom to steroids. The suitability of the book for its intended public is guaranteed by the fact that the author is senior chemistry lecturer at St. Thomas's Hospital Medical School.

Mechanical Aids to Productivity

THE sixth Mechanical Handling Exhibition, held in London last month, covered the complete range of mechanical handling plant from large-scale installations involving complete factory layout to all forms of portable units. More than 350 stands occupied 500,000 sq. ft. of floor space and afforded visitors a comprehensive display of conveyors, cranes, trucks, stackers, hoisting appliances, and bulk handling units, as well as large earthmoving equipment. An international character was created by products from many overseas countries including America, France, Belgium, Germany, Italy and Scandinavia.

One of the most impressive exhibits was ERIC, the British designed and manufactured electronic remote and independent controlled Robotug. This driverless tug can pull heavy loads about in factories or warehouses entirely unattended. Electronically controlled from a remote panel, all that is required to keep ERIC following the right path is an ordinary electric wire, set in or on the floor. It automatically stops whenever it meets an obstruction.

The main staircase was built by Dexion Ltd. from slotted angle. The design incorporated two identical staircase units each 35 ft. high. Over 10,000 feet of slotted angle and 4,000 feet of punched steel strap was used in its construction.

The chemical industries were represented by a number of firms. **M.G.K. Engineering Co. Ltd.** were established in 1942 as electrical and mechanical engineers. With the advent of the fork lift truck they started manufacture of steel pallets in 1946. They can, therefore, claim to be among the pioneers of palletisation in this country. Their experience in the field of materials handling has resulted in the palletisation of more than a hundred separate industries. Among them are Monsanto Chemicals, B.I.P. Chemicals, May and Baker Ltd. and Shell Chemicals Ltd.

The company's pallets are "tailor made" and their engineering staff are available for consultation as to clients' individual requirements. Their works, near Birmingham, are laid out specifically for the manufacture of pallets. They can be supplied at very competitive prices.

Other M.G.K. exhibits included a new range of stackable work pans, together with static and semi- or fully-mobile racks for accommodating them. There were also fully- and semi-mobile pallet convertors, works trailers, hand trucks and mesh crates.

Mono Pumps Ltd. gave working demonstrations of their pumps, one showing their P12 powder unit pumping dry powder through a circuit of piping. Fluidisation of the powder is achieved with only 1½ cu. ft/min. of free air at 5lb./p.s.i. pressure. Working units also demonstrated the Mono pump handling pulps and solids suspended in liquid.

Simon Handling Engineers Ltd. showed a continuous bulk materials handling installation controlled by *Select-O-Weigh* automatic proportioning system, automatically varying the proportion of four different materials. The unit included a container handling plant, incorporating a Simon Junior sifter. Control of proportioning was by punched card, and a solenoid-operated typewriter was linked to the system to record every weighing.

The principal exhibits of **Babcock and Wilcox Ltd.** were a mixer for powdered and semi-liquid materials, the *Jetpulsion* ejector-type pump for pipeline conveyance of water-and-solids mixtures, and a diorama of a phosphates ship-loading installation.

W. S. Barron and Son Ltd. are manufacturing an increasing quantity of specialised plant for the chemical industry. Their exhibit comprised screw-lift continuous screw elevators for elevating and conveying granular and powder material in bulk up to 3,000 cu.ft./hr; screw conveyors for the horizontal movement of materials in sizes from 4 in. up to 20 in. in diam.; and bin control gear.

The originators of the *En-Masse* principle of handling powdered or granular materials, **Redler Conveyors Ltd.**, demonstrated practical examples of Redler and R.B. systems. They included bin dischargers, for circular and rectangular bins, both mechanical and vibratory; and conveyors and elevators for moving materials around corners in plan or elevation.

Stainless steel vessels of every kind are manufactured for several chemical companies by **Bates Bros. (Engineers) Ltd.** There was a representative selection of bins, crates, pallets, stillages and conveyors.

Examples of conveyor and transmission belting were shown by **Silvertown Rubber Co. Ltd.**, some of these being fire-resistant and heat-resistant. Glass-fibre-reinforced vessels for handling corrosive fluids were seen.

Running concurrently with the Exhibition was a Materials Handling Convention which was addressed by five speakers from five different industries. A paper entitled "Focusing the Materials Handling Target" was given by Mr. G. R. Lunt of the Central Work Study Department of Imperial Chemical Industries Ltd.

An interesting programme of industrial films dealt with various aspects of mechanical handling.

Pneumatic handling. In a well-illustrated brochure Simon Handling Engineers Ltd. describe some of the factories where their pneumatic handling plants have been installed for bulk handling of materials. As well as fixed plants, many travelling and floating plants are used in this country and abroad.

BS.2890: Troughed Belt Conveyers. Far more than in previous conveyor standards, B.S. 2890 provides for the comprehensive standardisation of all major components, which makes for easier interchangeability and replacement of parts. The main sections of this 40-page standard specify important dimensions, and recommended limiting dimensions for the principal mechanical parts—*e.g.*, idler sets, pulleys and shafts. There is also much information on general mechanical requirements. Certain conditions are specified with regard to the provision of take-up devices, skirt plates, trippers and safety devices. Copies of the standard may be obtained from British Standards Institution, 2 Park Street, London, W.1. Price 8s. 6d.

Labelling. The Manufacturing Chemists' Association has published the proceedings of its 1957 conference on precautionary labelling. The 52-page book includes complete papers presented at the conference and copies can be obtained from the Manufacturing Chemists' Association Inc., 1625 Eye Street, N.W., Washington 6, D.C., price $1.

NOTES AND NOTIONS

XENOPHOBIA

ANOTHER example of newspaper distortion of the facts about the drug bill appeared in the *Sunday Express* on May 18. The article attacked the American invasion of the British pharmaceutical industry and sought to argue that patent and royalty payments to American firms have inflated the costs of the Health Service. This argument is based on an examination of the profits of Pfizer Ltd., which are alleged to have increased from £12,000 to £1,437,000 in three years. How can such a superficial examination of the situation justify the headline "The Great Raid on Your Medicine Chest"?

Of course we would like to think it possible to run the Health Service without foreign drugs and medicines. But we must face the fact that this would deprive the nation of essential drugs. How can we as a nation which has flourished for so long on selling our goods and services abroad object when we are at the receiving end of exports? Trade must be a two-way affair. In the vital field of pharmaceuticals, however, what would be the reaction of doctors and their patients if they were told they could not have the most effective antibiotic or vaccine because Britain has not got around to making it?

The argument in the *Sunday Express* is xenophobic nonsense. One does not have to be pro-American to discern its complete illogicality. The reason why the Americans are ahead of us is because they are spending £45 million a year on pharmaceutical research compared with our £4 million. All the first-class brains in the world cannot make up for this difference. Even the Swiss industry is thought to be spending £7 million a year on research. Reasons for our backwardness must be sought not in a superfical examination of the Health Service but in our general taxation policy for the past 20 years, which has in a large measure siphoned off funds which could have been made available for research.

In any case Britain spends less per head on medicines than many other countries. Our annual expenditure on prescribed drugs is only 13s. 8d. per head compared with 33s. in the U.S. and 55s. 4d. in Belgium. And, to come back to the *Sunday Express* article, what worthwhile economies could be made if we immediately banned all foreign drugs from the Service? The total drug bill is only £43 million, little more than 5% of the total N.H.S. cost.

OLFACTORY SQUALOR

"O, my offence is rank, it smells to heaven." With Hamlet the proprietor of a factory at Loughton, Essex, might well utter these despairing words after an action in the High Court in which he was found guilty of permitting the emission of a noxious smell to the annoyance of local residents. The smell came from a paint spraying process. Sometimes it was a pear-drop smell and at others an acrid burning smell. So revolting was it that residents were denied the pleasure of their gardens and forced to flee to nearby Epping Forest to recover.

I can sympathise with the factory owners whose only cure, apparently, was to build a 50-ft. high chimney. But I have even more sympathy with the harassed neighbours whose lives were made utterly miserable by these dreadful assaults upon their noses. Where is the much-vaunted town planning when it permits factories and houses to grow up haphazardly, each to become an offence to the other. Should not the local authority be armed with powers of powerful persuasion, at least, to induce the factory owners to take themselves off, smells as well? How can they go on demanding high rates from allegedly desirable residences when visual beauty is marred by olfactory squalor? People have a right to escape from the noise and smell of industry and it is monstrous that it should be forced into their homes. The Judge was right to assess damages at £350 and issue an injunction restraining the defendants from committing a nuisance.

Bookshop Service

All books reviewed in MANUFACTURING CHEMIST and all other scientific or technical books may be obtained from:

Technical Books,
308, Euston Road,
London, N.W.1.
Telephone: Euston 5911.

Prompt attention is given to all orders.

TAX FACTS

A BRISK attack on purchase tax on medicines in the House of Commons, led by Mr. Gerald Nabarro and Sir Hugh Linstead, was repelled by the Financial Secretary to the Treasury with the bland assertion that since anyone who needed drugs got them free (*sic*) the large residual expenditure on proprietaries was "properly the subject of taxation". I can understand the Exchequer clinging tight to the £11 million a year it gets from the group of commodities which includes medicines, but I cannot accept its argument for so doing. On the one hand there are mighty grumbles about the mounting cost of the Health Service (now running at £746 million p.a.), and on the other steps are taken to penalise those people who treat themselves for minor ills without worrying their doctor and adding still more to the national burden. It is another example of sanctions being applied to the self-reliant members of the community. One Labour member spoke of self-medication as a sinful indulgence. There are hypochondriacs, of course, but the vast majority of people who buy simple remedies instead of trotting to the doctor should be encouraged, not penalised. I agree with Sir Hugh Linstead that medicines should not be taxed. In any case there are so many anomalies as between taxed and untaxed medicines that the only cure is complete abolition of the tax.

An odd feature of the debate was that the Treasury appears to be more sympathetic to the idea of exempting veterinary medicines than human medicines. I would have thought that with the subsidies they enjoy farmers are in a better position to pay the tax than the thousands of ordinary people who pay the 30% impost on proprietaries. Not that I am in favour of taxing either category.

Cicerone

News . . .

Chemical engineering research centre

Work has now started on the £130,000 Research and Development Centre at Leven, Scotland, for the Balfour Group of companies.

The main objective of this undertaking is to carry out development work for improvement in the design and operation of chemical process plant for many industries, and to widen the application, fabrication techniques, and uses of new materials of construction.

The new Centre will also be available to demonstrate the application of existing designs of plant and process methods to clients' materials, to pioneer new processes and techniques, and to carry out work which would not justify the installation of special pilot plant by individual manufacturers themselves. The services of this laboratory with semi-scale plant facilities should be particularly helpful for smaller firms.

The Centre will provide training facilities in every sphere of chemical engineering. A Student and Graduate Apprenticeship scheme has already been launched in conjunction with local technical colleges to enable suitable young men and women to reach full professional status, and at the same time to receive valuable practical training in industry.

The companies which comprise the Balfour Group already have over 1,100 employees at Leven in the existing works. The new Centre is the first stage in the development of a recently purchased 25 acre site which will ultimately contain further fabrication shops and offices.

The arrangement of the building has been planned to co-ordinate current development projects and the housing of equipment from existing laboratories within the Group. The main pilot plant bay will be 160 ft. long, 45 ft. wide, 30 ft. to the eaves, with a tower giving a headroom of 40 ft. but capable of expanding to 56 ft. A separate pilot plant laboratory will deal with size reduction, with special reference to dust problems. There will be a specially isolated laboratory for solvent extraction and work with inflammable solvents and noxious gases. Here radioactive material can be dealt with in comparative safety.

In addition, there will be metallurgical laboratories, dark rooms, a corrosion laboratory, a physical chemistry laboratory, a general analytical laboratory, a chemical development laboratory, and two ceramic chemistry laboratories for the glassed steel process of Enamelled Metal Products Ltd.

The pilot plant bays will house a complete range of unit operation equipment including heat exchangers, evaporators, distillation columns, high vacuum and molecular stills, vacuum dryers, spray dryers, prebreakers, and size reduction units.

The services provided are comprehensive, including steam at 50-300 psi, water, compressed air, power, and vacuum. There is also a wide variety of "pots and pans" filters, pumps, screens, instruments, and other plant essential to the proper equipping of a versatile pilot plant laboratory.

The laboratories will be officially opened in the spring of 1959.

Society of Cosmetic Chemists is ten years old

The annual general meeting of the Society of Cosmetic Chemists of Great Britain, held in London on May 16, marked the tenth anniversary of the foundation of the Society. The meeting was followed by a dinner at 55 Park Lane at which informal speeches were made by the outgoing president, Mr. Jack Pickthall, the incoming president, Dr. R. H. Marriott, and Mr. F. V. Wells, the founder-chairman of the society. Mr. Wells modestly disclaimed the title of "father" of the society. He said that its formation was mainly due to the enthusiasm of Mr. M. G. deNavarre of the American society who had persuaded him to take the first steps. Mr. Wells paid tributes to other founder members, particularly the first secretary, Mr. H. Holmes.

At the formal business preceding the dinner great regret was expressed at Dr. A. W. Middleton's inability to take on the presidency; tributes were paid to the devoted work he had given to the society.

Regret was also expressed at the retirement of Mr. F. Riley from the secretaryship after a period in office during which the affairs of the society were transformed.

In accepting another period as president, Dr. Marriott said he would appreciate all the help he could get in organising next year's Congress of Cosmetic Science in London.

The new vice-president of the society is Dr. H. W. Hibbott. The new hon. secretary is P. A. Lincoln and the hon. treasurer is R. E. Spate.

Monsanto extensions

Monsanto Chemicals Ltd. are planning to extend their factory in Newport, Mon.

I.C.I. training centre

A training centre with facilities for all grades of employees has been opened at the Wilton works of Imperial Chemical Industries Ltd. by Sir Ewart Smith, F.R.S., a deputy chairman. In September a commercial student apprentice scheme will be inaugurated.

New B.O.G. factory

A factory now being built in Glasgow will enable British Oxygen Gases Ltd. to meet increased demands for their industrial gases in Scotland.

The new 25-acre site is close to the company's factory at Polmadie, and a compressing station and stores together with a liquid oxygen plant will be erected there.

More ethylene urea

Whiffen and Sons Ltd. will shortly have available increased quantities of ethylene urea from additional plant now being installed. Total capacity will cover the needs of the United Kingdom, with a surplus for export markets.

Evans Medical Supplies make higher profits

Net profit of Evans Medical Supplies Ltd. and its subsidiaries, after taxation, amounted to £159,374 compared with £119,052 in 1956.

A new subsidiary company, Evans Medical (Liberia) Ltd., was incorporated in December 1957 to implement an agreement signed with the Government of the Republic of Liberia whereby they have been appointed sole suppliers and purchasing agents throughout the world of all pharmaceutical products, surgical dressings, and medical equipment, for an initial period of years.

The company has been appointed national distributors of American and Canadian poliomyelitis Salk vaccine.

Work is well advanced on new laboratories which will enable Evans to undertake a considerably larger research programme.

Name changed

The name of the Association of British Insecticide Manufacturers has been changed to:

ASSOCIATION OF BRITISH MANUFACTURERS OF AGRICULTURAL CHEMICALS (Insecticides, Fungicides, Herbicides)

When the Association was formed in 1928 its functions were concentrated wholly on insecticides and fungicides. Today weedkillers are possibly the most important products. Because of this the old name is no longer truly descriptive. Additionally, and of greater importance in deciding upon a new name was the possibility, in the near future, that there will be a European Common Market.

Albright and Wilson sales reach £30 million

Sales of all companies in the Albright and Wilson Group expanded in 1957, the total being about 10% higher, at £30 million compared with £27 million in 1956. In the U.K., the anti-inflation measures did not seem to influence sales. Exports continued to account for between a fifth and a quarter of total sales. In Canada the growth in sales and profits was less than expected: there were strikes affecting transport and some customers, and there was intensified competition from United States producers, aided by the premium on the Canadian dollar. A considerable increase in sales and profits was achieved in Australia, where the synthetic detergent market is rapidly expanding sales of phosphate esters to the oil and plastics industries also increased significantly. From the Group's investment in the United States, now represented by its holding in Hooker Electrochemical Company, dividends of $378,000 were received during the year.

Development. In 1957 Group capital expenditure amounted to about £2 million. Among the projects in the United Kingdom were the extension of Marchon's phosphates plant, the building of a ship for Astoria Shipping and Transport Co., and plants for a number of new phosphorous compounds made by Albright and Wilson (Mfg.). In Canada, the new sodium chlorate plant at Vancouver was completed and work was begun on extensions to the plant for this product at Buckingham, Quebec. In Australia, the main items of expenditure were the building of an additional phosphorus furnace and the purchase of new office premises. Projects for 1958 include additions to research and development facilities in the United Kingdom, further phosphate and sodium chlorate manufacturing extensions in Canada, and a plant for detergent sulphonates in Australia.

Prospects for 1958. In the first three months of this year Group sales and profits have been higher than for the corresponding months of 1957, but not as high as had been hoped at the time of budgeting. It seems likely from information so far available that this general pattern will persist for much of the year.

Profits for 1957 for the Group were £4,754,000 (£4,416,000), net £1,553,000 (£1,203,000).

Tower packing rings

Henry Hawkins Ltd. have been granted by the B.A.S.F. of Ludwigshafen, West Germany, the sole licence for the manufacture and sale of Pall tower packing rings in the British Isles. This new tower packing is claimed to be an improvement on other types.

Technical Press Review—June

Atomics.—Safety for Atomic Workers; Ground Disposal of Radio-active Wastes; Radiation and its Hazards; Glass against Radiation; The Status of Nuclear Data for Reactors; Ship Propulsion by Nuclear Power.

Automation Progress. — Electronic Controls at a Modern Sugar Factory; The Instrumentation of Chemical Process Plant; Programme-controlled Roughing in an American Steel Mill; Electromagnetic Brakes and Clutches in Recent Automatic Plant; Recent Work on Reading Machines for Data Processing; A Low-cost Spectro-photometer.

Chemical and Process Engineering.—Carbon in Industry; Chemical Engineering and the Quest for Abundant Power; Preview of the Chemical and Petroleum Engineering Exhibition.

Paint Manufacture. — Preview of the Chemical and Petroleum Engineering Exhibition; Surface Coatings Derived from Tall Oil—2; The Second Conference of the Association of Printing Technologists; Review of Plant and Equipment.

Petroleum.—Nickel and Cobalt Catalysts in the Petroleum Industry; An Immersion Viscometer; Economic Air Drilling; Instrumentation at Tidewater Oil Refinery; Recent Progress in Sulphuric Acid Alkylation.

Dairy Engineering. — Electrical Equipment for Dairies; Maintenance and Control of Refrigeration Plant; Survey of Refrigeration Plant; Milk Publicity: A Comparison between British and American Methods; Spring Meeting of the Society of Dairy Technology.

World Crops. — Provision of Water for Irrigation; Advances in the Irrigation of Pastures in New Zealand; Conserving Soil with Pastures; Review of the Crop Protection and Pest Control Exhibition.

Sampling offers

Small size sample tubes of mascara were designed and filled by Evans of Elstree during a free sample scheme organised by a weekly film magazine. Two tubes, a brush, instructions and a note from the editor were enclosed in a plain cardboard carton with a protruding flap. Cosmetics appear to be specially suitable for sampling offers of this kind.

Synthetic detergents in sewage

The publication of the White Paper covering the work of the Cremer Committee on the subject of synthetic detergents in sewage, has focused attention on the fact that most, if not all, of the synthetic detergents at present in use cannot be broken down by sewage bacteria and hence persist in sewage and sewage effluents, giving rise to various foaming problems in drains, sewage, disposal works, rivers, harbours, docks, etc.

A new range of synthetic detergents based upon sucrose esters, *i.e.* combinations of sugar and edible fatty acids, appear likely to assist in overcoming this problem.

These products are simple carboxylic esters of sucrose and it would be anticipated, by analogy with similar materials such as fats and fatty oils, that ready breakdown would occur in the presence of the normal sewage bacteria. In these circumstances it would appear probable that the sucrose esters will not give rise to the problems at present being considered by the Cremer Committee. Research work is now in progress to establish whether this hypothesis is, in fact, correct.

One of these materials, sucrose stearate, has already been shown by laboratory tests to have interesting properties as a scouring agent for both synthetic fibres and wool. It has been shown to have good detergency power and, in some cases, to give improved colour and a handle superior to that obtained when using conventional scouring agents.

These materials were initially developed by the Sugar Research Foundation in the U.S.A. who have taken out various patents in connection with them.

Howards of Ilford Ltd., who had done considerable work on parallel lines, are now licensees of the Sugar Research Foundation patents in this country and have samples of the various sugar esters available for investigation by detergent and textile manufacturers, and others.

70 years veteran

On April 8, Mr. Edward Ives was entertained to luncheon by the directors of W. J. Bush and Co. Ltd. and Potter and Moore Ltd. to receive a presentation in honour of his remarkable achievement in completing 70 years of unbroken service with the Bush Group of Companies.

"Teddy," by which name he has always been affectionately known, entered the service of W. J. Bush at No. 26/30 Artillery Lane, which was then the headquarters of the company, on April 8, 1888. He later served the company at Ash Grove, Hackney, where he remained until his transfer to the associated company of Potter and Moore Ltd. in 1929. Now, in his 84th year, he is still working.

People

Lankro Chemicals Ltd. have appointed **Mr. J. L. Southworth,** B.SC., late of British Northrop Loom Co. Ltd., to cover the north and north-west of England, and **Mr. W. I. Hyslop,** M.SC., late of Courtaulds, to cover the north and north-east of England. These appointments have been made because of the company's increasing interests in surface-active agents.

Benger Laboratories have made a further sales region in southern and south-western England. Appointed as the new acting regional manager is **Mr. Derick C. Smith.** He joined Benger in 1956 from C. L. Bencard Ltd. Over the past year he has been connected with the promotion of Benger products in Australasia.

Mr. John B. Davies, joint sales manager of Lawes Chemical Co. Ltd.—the oldest fertiliser firm in the world—has been appointed a director of the company. He joined Lawes as a junior member of the staff in 1944 and was appointed joint sales manager ten years later. He is 30.

Mr. Thomas F. W. Jackson has been appointed chairman and managing director of Union Carbide Ltd., in succession to Mr. W. B. H. Gallwey who died last December. Mr. Jackson was born in Sydney, Australia, in 1913. In 1954 he became managing director of National Carbon Philippines Inc. (another Union Carbide concern) and was responsible not only for trading activities but also the construction of the plant itself. In the Philippines he also became president of Maria Cristina Chemical Industries Inc. (a partly-owned subsidiary of Union Carbide), which manufactures calcium carbide at Iligan City, Mindanao. Mr. Jackson is also a director of Union Carbide's affiliated companies Gemec Ltd. (chairman and managing), Bakelite Ltd. and British Acheson Electrodes Ltd.

Mr. Robert Carr, M.P., formerly Parliamentary Secretary to the Ministry of Labour and National Service, has rejoined the John Dale Group of companies as chairman. He will continue as M.P. for Mitcham, which constituency he has represented since 1950. Mr. Carr first joined John Dale Ltd. in 1938, leaving in 1955 when he took up his ministerial appointment. **Mr. J. W. G. Collins** has been appointed assistant managing director of the organisation, having been with them since 1945.

Mr. R. S. Harden has been appointed raw materials buyer for the Kingsway Works, Luton, of Laporte Chemicals Ltd.

Mr. F. A. S. Wood

Mr. R. Carr

The Wellcome Foundation Ltd. announce that **Dr. R. S. F. Hennessey,** C.M.G., M.D., has been appointed head of their therapeutic research division, which consists of the Wellcome Laboratories of Tropical Medicine (London), the Chemical Research Laboratory and Pharmacology Laboratory (Wellcome Research Laboratories, Beckenham).

Dr. L. G. Goodwin, M.B., B.PHARM., has been appointed head of the Wellcome Laboratories of Tropical Medicine in succession to Dr. Hennessey.

At a recent meeting of the British Lampblown Scientific Glassware Manufacturers' Association, **Mr. Stanley J. Davies,** chairman and joint managing director of A. Gallenkamp and Co. Ltd., was elected President.

Mr. J. B. C. Carr has been appointed general manager and secretary of the Fertiliser Manufacturers' Association, in succession to the late Dr. G. F. New, O.B.E. He has also been appointed secretary of the Superphosphate Manufacturers' Association. He is a barrister.

Mr. B. J. Thomas, M.P.S., D.B.A., of Allen and Hanburys Ltd., has been appointed a member of the Standing Pharmaceutical Advisory Committee.

Laporte Industries Ltd. have appointed **Mr. R. Terrington** chief buyer raw materials. He will be responsible for the co-ordination of all raw material purchases.

Mr. Reginald George Hoare has been appointed to the board of the Pharmaceuticals Division of Imperial Chemical Industries Ltd. A pharmacist, he joined I.C.I. (China) Ltd. in the Pharmaceuticals Department, Shanghai, in 1946. In 1948 he was transferred to their Hong Kong office to take charge of the Pharmaceuticals Department. In 1950 he was appointed a deputy local director of I.C.I. (Export) Ltd., Djakarta. Returning to this country in 1953, Mr. Hoare was appointed assistant to the overseas sales manager of the Pharmaceuticals Division, and in March 1956 became commercial services manager.

OBITUARY

Dr. Thomas A. Henry died on Sunday, May 4, at the age of 85. From 1919 to 1943 he was the Director of the Wellcome Chemical Research Laboratories. He was the author of the standard work "The Plant Alkaloids."

Formation of Croda Belge

The formation of a new company is announced by Croda Ltd. It is called Croda Belge, with head office at Vevviers.

President of the new company is Mr. F. A. S. Wood, 31-year-old managing director of the Croda organisation, which has associate companies in the U.S. and Italy. The managing director is Mr. Werner Daveloose, a Flemish industrialist.

"The objective of our new company is to increase Croda's export business and serve the northern part of the European market which we are now doing with Croda Italiana," said Mr. Wood. "We will manufacture lanolin for the cosmetic and pharmaceutical industries and use it to make the same anti-corrosive compounds which have been so successful in the U.K., but which we have never made for Belgium."

There are no other lanolin manufacturers in Belgium. Croda is the first British industrial concern to set "roots" in Belgium since the opening of the World Fair at Brussels.

Disinfectant Association officers

The following have been elected officers of the British Disinfectant Manufacturers' Association for 1958-59.

Chairman: Mr. H. C. Askew, Reckitt and Sons Ltd. Vice-Chairman: Mr. S. L. Waide, Newton Chambers and Co. Ltd. Hon. Treasurer: Mr. V. G. Gibbs, William Pearson Ltd.

London subsidiary

To give on-the-spot service to their customers in southern England Lavapine Ltd., Dundee, manufacturers of Highland Air, Slipperine Dance Polish and the Lavapine range of chemical products have formed a subsidiary company in London, Lavapine (Southern) Ltd., with registered office at 348-350 Greenford Avenue, London, W. 7.

Directors of the new company are, chairman, J. Armstrong-Payne (chairman of the parent concern), managing director, R. S. Morpeth, F.P.S., and G. P. Peebles. Mrs J. Bright has been appointed secretary.

Toxicity of PTFE

A story has been told throughout the world that PTFE (polytetrafluoroethylene) was responsible for the death of a man who smoked a cigarette while working with this material. Imperial Chemical Industries state that this story is not true; exhaustive enquiries both by the Ministry of Supply and the appropriate Governmental bodies in the U.S.A. have failed to confirm that such a death has occurred.

PTFE is an inert non-toxic material, but if it is overheated above 350°C. toxic fumes are liable to be released due to the decomposition of the polymer. The time for which the material is heated naturally determines the quantity of decomposition products. Thus fumes may arise from sintering or machining, but their inhalation can easily be prevented by the application of local exhaust ventilation applied as near as possible to the source.

The most serious hazard in working with PTFE arises from its decomposition on burning tobacco, as the decomposition products are liable to be inhaled. For this reason smoking should not be permitted in workshops where PTFE is processed. There is a toxic hazard when processing PTFE, but it can be reduced to negligible proportions by taking simple, sensible precautions, which include adequate ventilation and a ban on smoking. The most serious symptoms recorded are rather like a dose of influenza lasting only a few hours.

K.I.D. exemptions

The following chemicals have been exempted from Key Industry Duty until August 18, 1958:

p-Aminobenzoic acid
Androst-5-en-3β-ol-17-one acetate
mono-Chloroacetone
OO-Dimethyl methylcarbamoylmethyl phosphorodithioate (a methyl ester)
p-Dioxan-2 : -dithiol di-(*OO*-diethyl phosphorodithioate) (an ethyl ester)
Diphenyl *o*-phthalate (a hydroxybenzene ester)
n-Dodecane-1-thiol
Formamide
Manganese ethylenebisdithiocarbamate (a salt of a substituted dithiocarbamic acid)
Methylhydroxyethylcellulose of which not less than 90% by weight passes a sieve having a nominal mesh number of 30 and of which not more than 20% by weight passes a sieve having a nominal mesh number of 72, both of which conform to British Standard 410 : 1943.
6-Methyl-α-ionone
1 : 5-Pentamethylenetetrazole
Sodium fluoride, which does not contain impurities equivalent to more than 5×10^{-2} grammes of U_3O_8 per gramme, and of which 1 gramme does not contain impurities capable of depressing the estimation of U_3O_8 by more than $1 + 10^{-2}$ grammes, when determined fluorimetrically.
Tolylene-2 : 5-diamine sulphate (a tolylene diamine salt)

Bacteriologists' conference

The annual meeting and summer conference of the Society for Applied Bacteriology will be held in Bristol from July 7-10. Further details can be obtained from the Hon. Secretary, Mr. G. Sykes, Boots Pure Drug Co. Ltd., Beeston, Nottingham.

Mr. W. Leonard Hill (left), Chairman of Leonard Hill Ltd., proprietors of "World Crops," chatting with exhibitors at the Crop Protection and Pest Control Exhibition, organised by that journal in London last month.

New men and new plant for pyrethrum industry

The Pyrethrum Board of Kenya, acting on behalf of Kenya, Tanganyika and Belgian Congo growers, has established a European technical sales headquarters in London.

The European HQ. will be known as the African Pyrethrum Technical Information Centre Limited (APTIC). Dr. T. F. West, D.SC., F.R.I.C., has been appointed to head it with the title of European Operations Executive. Until recently he was a director of Drug Houses of Australia Ltd.

In Kenya the post of director of scientific services has been established and Dr. Alan Goldberg, D.SC., F.R.I.C., has been appointed to it.

Erection of the Pyrethrum Board of Kenya's extraction plant at Nakuru in Kenya has begun and Mr. J. Huntley, a Hull engineer of long experience with the British manufacturers of the plant, will manage it.

The Board, acting on its own behalf and on behalf of the Pyrethrum Board of Tanganyika and the co-operative (Société Coopérative des Produits Agricoles—SOCOPA) to which most of the Congo growers belong, is to undertake a major sales and technical advisory campaign in Germany

Messrs. Biddle Sawyer and Co. Ltd. have been appointed United Kingdom and Ireland agents to the Boards and SOCOPA.

Company Finance

Van den Bergh's en Jurgens' Fabrieken N.V. Net profit for 1957 amounted to Fl.10,026,351 compared with the 1956 total of Fl.12,120,877.

Timothy Whites and Taylors Ltd. The trading profit and sundry income of the Group amounted to £1,745,362 in 1957 compared with £1,670,681 in the previous year.

British Oil and Cake Mills Ltd. Profit for 1957 after tax was £1,463,462 (£1,285,820).

Glaxo Laboratories Ltd. Unaudited trading profits for the six months to December 31, 1957, totalled £2,509,000 against £1,601,000 in the comparable six months in 1956. Group turnover for the period (excluding sales by the South American subsidiaries which are not consolidated) increased by 24% as compared with the corresponding period in the previous financial year, and by 5% as compared with the six months ended June 30, 1957.

Colgate-Palmolive Co. In 1957 consolidated net income totalled $19,930,000 or $7·81 per share of common stock. This compares with consolidated income of $15,477,000 or $6·04 per share in 1956. These figures include results from the British company and all other overseas subsidiaries. World-wide sales for 1957 totalled $506,910,000 as compared with $508,523,000 in 1956. U.S. sales were slightly lower than in the preceding year, due in part to the termination of the company's contract with Chesebrough-Ponds Inc., covering distribution of Vaseline products, but foreign sales climbed to a new record.

More approved names for drugs

A new list of approved names for drugs has been issued by the British Pharmacopoeia Commission, and the intention is that if any of the drugs to which these Approved Names are applied should eventually be described in the British Pharmacopœia the Approved name should be its official title.

The names appearing in the second column of the following list include some registered trade marks.

Approved name — *Other names*

CHLORPHENOCTIUM AMSONATE
2 : 4 - Dichlorophenoxymethyldimethyl - *n* - octylammonium amsonate. (Amsonic acid is adopted as the trivial name for 4 : 4′-diaminostilbene-2 : 2′-disulphonic acid.)

CHLORPROGUANIL
N^1 - 3 : 4 - Dichlorophenyl - N^5 - *iso*propyldiguanide Lapudrine is the hydrochloride

DEXTROMORAMIDE
(+) - 1- (β - Methyl - γ-morpholino-αα - diphenylbutyryl)-pyrrolidine
Jetrium; R.875

DIMETHICONE
A polydimethylsiloxane

ETHOTOIN
3-Ethyl-5-phenylhydantoin
Peganone

HYDROXYCHLOROQUINE
7 - Chloro - 4 - [4 - (*N* - ethyl - *N* - 2 - hydroxyethylamino)-1-methylbutylamino]quinoline
Plaquenil is the sulphate

ISOTHIPENDYL
10 - (2 - Dimethylaminopropyl) - 10 - thia - 1 : 9 - diaza-anthracene
Nilergex is the hydrochloride; Theruhistin is the hydrochloride

LEVOMORAMIDE
(−) - 1 - (β - Methyl - γ - morpholino - αα - diphenylbutyryl)-pyrrolidine

NORETHISTERONE
17β-Hydroxy-19-norpregn-4-en-20-yn-3-one
17α-Ethynyl-17β-hydroxyoestr-4-en-3-one
17α-Ethynyl-19-nortestosterone
Norlutin; Primolut N

PECAZINE
10 - (1 - Methyl - 3 - piperidylmethyl) phenothiazine
The name Pacatal is applied to the hydrochloride and the acetate

PERPHENAZINE
1 - [3 - (2 - Chloro - 10 - phenothiazinyl)propyl]-4-(2-hydroxyethyl) piperazine
Fentazin; Trilafon

PHENACTROPINIUM CHLORIDE
N - Phenacylhomatropinium chloride
Trophenium

POSKINE
Propionylhyoscine
Proscopine is the hydrobromide

RACEMORAMIDE
(±) - 1 - (β - Methyl - γ - morpholino - αα - diphenylbutyryl) - pyrrolidine

RISTOCETIN
Antimicrobial substances produced by *Nocardia lurida*
Spontin contains Ristocetin A and Ristocetin B

SALINAZID
N - *iso*Nicotinoyl - *N′* - salicylidenehydrazine
Nupa-sal

SULPHAPROXYLINE
N^1 - (4 - *iso*Propoxybenzoyl) - *p* - aminobenzenesulphonamide

TACRINE
5 - Amino - 1 : 2 : 3 : 4 - tetrahydroacridine

TRIAMCINOLONE
9α - Fluoro - 11β : 16α : 17α : 21 - tetrahydroxypregna-1 : 4-diene-3 : 20-dione
9α-Fluoro-16α-hydroxyprednisolone
Aristocort; Ledercort

TROPIGLINE
Tiglytropine

Albro in Dusseldorf

A range of Albro filling and capping machines was on view at the "Interpack" exhibition in Dusseldorf.

Included were a fully automatic vacuum operated rotary filler for wines and other liquids, a fully automatic vacuum operated filler for powders; a high-speed automatic capper (plus a semi-automatic model); some weight operated fillers for paints and oils; a small volumetric filler; a stopper corking depositing hopper; and a pneumatically operated flogger.

These exhibits were said to show considerable advantages over some of the continental machines, especially as regards flexibility of change-over to various products and containers, and also ease of cleaning.

Instrument agency

Short and Mason Ltd. have signed an agreement with A.G. Chemisches Institut Dr. A. G. Epprecht, Zurich, whereby they will act as sole agents in Great Britain for the range of Drage instruments. An instrument application department has been set up to deal with enquiries and advise on the use and installation of the instruments which include torsional viscometers and rheometers and plant assemblies for automatic control of viscosity.

B.C.P.M.A. elections

At the 38th annual general meeting of British Chemical Plant Manufacturers' Association, Mr. H. W. Fender, M.INST.B.E., A.C.I.S., vice-chairman and managing director of Prodorite Ltd., was elected chairman of the Association for the ensuing year. He has been a member of the B.C.P.M.A. Council and the Executive Committee since 1951 and served as a vice-chairman from 1954 to 1956.

The following were elected to the Council:

Mr. J. Bishop, Nordac Ltd.;
Mr. J. C. Haithwaite, John Thompsons (Dudley) Ltd.;
Mr. I. M. O. Hutchison, Henry Balfour and Co. Ltd.;
Mr. B. H. Turpin, Q.V.F. Ltd.
Mr. M. Wyndham, Bennett, Sons and Shears Ltd.

At its quarterly meeting after the annual general Meeting the Council elected the following officers:

Vice-chairmen:
Mr. N. C. Fraser, W. J. Fraser and Co. Ltd.;
Dr. R. Lessing, The Hydronyl Syndicate Ltd.;
Mr. P. W. Seligman, The A.P.V. Co. Ltd.;

Hon. treasurer:
Mr. M. Wyndham, Bennett, Sons and Shears Ltd.

THE CHEMICAL MARKET

SUBSTANTIAL INCREASES AND REDUCTIONS

LONDON.—Pressure on space has forced us to hold over our price list until next month. A sharp increase has been reported in the price of **morphine,** formerly £106 14s. kg. and now £138 18s. 4d. **Atropine,** alkaloid, is £69 10s. kg. as against last month's price of £59 18s. **Codeine,** alkaloid, is also dearer, from £103 3s. kg. to £106 7s. 6d. **Calcium glycerophosphate** is 28s. 6d. kg. instead of 22s. Other price increases are shown in **mercurious chloride (calomel)** from 62s. 3d. kg. to 65s., **caffeine,** from 42s. kg. to 42s. 6d., **hydroquinone,** from 22s. 6d. kg. to 23s. 10d., **acetanilide,** from 7s. 2d. kg. to 7s. 4d., and **silver nitrate,** from 4s. 2⅛d. to 5s. oz. Downward trends are reflected in several instances. **Zinc oxide,** formerly £127 ton is now £100 10s., and **n-butyl alcohol** from £152 ton to £142. **Glycine (amino acetic acid)** is quoted at 18s. 10d. kg. as against 22s. 4d. **Hexyl resorcinol** is now £7 10s. kg. instead of £7 15s. **Iodoform** is cheaper by 2s. bringing it to 42s. 6d. kg. A reduction of 6d. makes **procaine hydrochloride** 59s. kg. **Lactose** is down from 3s. 4d. kg. to 3s. 2d., and **naphthalene,** ball and flake, from £73 14s. 5d. to £73 14s. 3d. Gums and waxes fluctuate. **Beeswax,** Sudan spot, is cheaper by 10s., making it £28 cwt. while bleached white (slab) formerly £30 cwt. is now £31, and refined yellow (slab) is £29 10s. cwt. which is 10s. dearer than last month. **Benzoin,** Sumatra spot, is down from £28 cwt. to £27 10s. **Carnauba,** prime spot, is £1 cheaper, making it £51 cwt., while fatty grey takes an upward trend from £29 10s. cwt. to £30. Most grades of **shellac** are reduced in price, No. 1 orange from £14 cwt. to £13 10s., No. 2 orange from £12 cwt. to £11 15s. and transparent white from 4s. 6d. lb. to 4s. 4d.

News from Abroad

TURKEY

Nitrogen fertiliser production

The nitrogen factory at Kutahya, the construction of which started in 1955, is expected to come into production early in 1959. It is being constructed by the Badische Soda and Analin G.m.b.H.

CEYLON

Chemical factory opened

The Government chemical factory at Paranthan has been inaugurated. It has a capacity of 5 tons of caustic soda, 4·4 tons of chlorine and 0·125 ton of hydrogen per day.

CUBA

Acid plant

The local mining company, Cia. Operadora Rometales S.A., has been granted a loan of up to $7·4 million by the Bank of Economic and Social Development to construct a sulphuric acid plant at the port of Santa Lucia in Pinar del Rio. The contract for the plant has been awarded to Krebs and Co. of Paris.

PHILIPPINES

New industries

Super Chemicals Corporation, Manila, has been formed (capital of ₱1 million) to manufacture chemicals and acids.

Blue Ribbon Enterprises Inc., Mandaluyong, Rizal, has been formed (capital of ₱500,000) to manufacture laundry and toilet soap and other oil products.

SOUTH AFRICA

Nitrogen plant contract

African Explosives and Chemical Industries Ltd. are increasing the capacity of their No. 2 ammonia unit at their Modderfontein factory and they have awarded certain contracts for extensions and additions to this unit to the Power-Gas Corporation Ltd. Stockton-on-Tees, and their associate Ashmore, Benson, Pease and Co. Africa (Pty.) Ltd. of Johannesburg.

The increase in the ammonia synthesis capacity of the No.2 unit will be met by a new synthesis section to produce the additional requirements of anhydrous liquid ammonia. This plant will be designed by I.C.I. (Billingham Division), and engineered and supplied by the Power-Gas Corporation Ltd. with the exception of the synthesis converters which I.C.I. will themselves supply direct to African Explosives and Chemical Industries Ltd.

CANADA

Growth of chemical industries

The chemical industry, whose production was up by nearly 5% in 1957, has been less affected by lower demand than most. There are a number of major expansion schemes under way or planned. There is increased emphasis on organic chemicals, primarily petrochemicals. Total investment in 1958 is forecast at $198 million, slightly higher than in 1957.

In Quebec, Shawinigan Chemicals Ltd, have a new caustic chlorine plant scheduled for completion in 1958. Carbide Chemicals Co. started production of ethylene oxide, ethylene glycol and H.P. polyethylene in the spring of 1957 and are now expanding their capacity for these products. Nichols Chemical Co. Ltd. have a plant for fluorides and fluorborates nearing completion. The Shell Oil Co. have new plant to produce detergent alkylate, alkyl additives for high-octane gasoline and epoxy type resins scheduled for completion in 1958. At Sarnia in Ontario Imperial Oil are constructing new plant to recover hydrocarbon products, Canadian Oil a plant to recover benzine, toluene and xylene, and Dupont a plant for the production of linear polyethylene.

The Dow Chemical Co., also at Sarnia, are continuing their major expansion programme and have under construction plant to produce more ethylene glycol, styrene, chlorine and ethylene.

The Electric Reduction Co. are building a $5 million plant at Port Maitland for the production of phosphoric acid. Canadian Industries Ltd. are erecting a $3 million plant at Copper Cliff to produce sulphuric acid, and a new ammonia plant at Millhaven. Noranda Mines are expanding their sulphuric acid plant at Cutler and the Barton Co. are building a $400,000 plant at Toronto to produce adhesives, coatings and other chemical products.

In the Prairies, Canadian Industries Ltd. are expanding their polyethylene plant at Edmonton to double production to 40 million lb. per year by 1959.

The British American Oil Co. sulphur plant at Pincher Greek is now in production, but a further $15 million is expected to be spent by 1961. The Shell Oil Co. in association with others, plan a $2 million sulphur plant at Okato, and the Jefferson Lake Sulphur Co. plan another near Calgary in association with Mobiloil Ltd. In British Columbia Pennsylvania Salt Co. Ltd. have acquired a waterfront property and will probably start construction of a chemical plant this year.

SYRIA

Pharmaceutical industry planned

The Syrian Ministry of Health is reported to be planning the construction of a factory for the manufacture of pharmaceuticals, notably penicillin, streptomycin and insulin.

MEXICO

Increased sulphur production

Sulphur production increased from 180,000 tons in 1955 to 502,000 tons in 1956, and in 1957 to well over one million tons. The principal firm in this industry is the Pan American Sulphur Company at Jaltipan. The average market price during the year was 25 pesos per ton.

COLOMBIA

Pharmaceutical production

Seventeen pharmaceutical laboratories are operating in Cali. The latest to open are a branch of the Italian firm Carles Herba and the German concern Hoechst, which belongs to the Bayer group.

BELGIUM

New chemical company

A new chemical company, S.A. Argus Chemical, has been registered. Its capital has been subscribed jointly by Union Chimique Belge S.A. and Argus Chemical Corporation of America. The firm will manufacture under licence of the Argus Chemical Corporation stabilisers and plasticisers specially for vinyl chloride polymers. It will have the exclusive rights for products at present manufactured by Argus Chemical Corporation in all countries except the United Kingdom, Yugoslavia and Scandinavia; also in Africa except in Commonwealth countries and in Brazil.

IRISH REPUBLIC

Extensions to drug index

The Irish Drug Association will include in their Annual Index and Price List, starting with the 1958 edition, lists of: (*a*) Approved Manufacturers: and (*b*) Approved Wholesalers.

These lists, which can be added to during each year, will show the names of firms who confirm that retail distribution and retail supplying are confined exclusively to shops keeping open under the various Irish Pharmacy Acts and who only supply other approved firms, the medical professions, hospitals and other State institutions.

New Products

Plant growth stimulant

Murphy Gibberellin, containing gibberellic acid, is now available to commercial growers in tablet form. It is used at two rates of concentration, depending on the plants to be treated. Rate I requires one tablet to 2½ pints of water, and Rate 2 one tablet to ¼ pint of water. While the product is non-poisonous, a period of four weeks should be left after treatment before treated plants or fruits are used for human consumption. Murphy Gibberellin should be used during the season of manufacture.

A pack of four tablets, complete with applicator, costs 40s., sufficient to make 10 pints of solution at Rate I.

✶

Anti-fungal cream

Imperial Chemical Industries Ltd. Pharmaceuticals Division have added *Glyped* cream to their range of medical products. It is said to offer a new approach in the control of fungous infections of the skin, particularly athlete's foot. By means of a self-controlled enzyme action on the skin *Glyped* cream provides effective anti-fungal therapy. It contains 25% of glyceryl triacetate in an emollient cream base. Free fatty acid (acetic plus glycerin) is released and maintained at a constant level on the skin, within a *p*H range of the optimum therapeutic effect.

It is issued in tubes of 25 g. at a retail price of 5s. 5d.

The product is manufactured under licence from the Wisconsin Alumini Research Foundation patent applications on file.

✶

Wide activity insecticide for home gardeners

The first British garden insecticide to be packed in an aerosol container has been launched by Fisons Ltd. Called *Kil*, it sells at 6s. 6d. Four and 8 oz. bottles are also available at 3s. 6d. and 5s. 9d. respectively.

Kil is a combination of DDT and the organo-phosphorus insecticide malathion. It is said to be quite harmless to most plants, except those of the marrow family, and to humans. It is claimed to control effectively no fewer than 31 common garden pests and is said to be the first insecticide for the amateur gardener with such a wide range of action "against most pests which attack plants above ground." It is not suitable for soil pests.

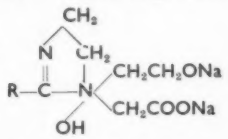
For general use 1 fl. oz. of *Kil* is mixed with 2 gal. of water and sprayed with a garden syringe. Because it produces a finer mist, however, the aerosol version is likely to be more effective. It will prove a great convenience to the ordinary gardener who does not want the bother of mixing ingredients and buying a syringe.

The new Fisons insecticide "Kil" was developed at the Chesterford Park Research Station, near Saffron Walden, Essex. Here a test is in progress in the biological screening laboratory, each pot being ringed with an electric "fence" to confine insects to the treated plants under controlled conditions.

✶

New range of amphoteric surface-active agents

Cyclo Chemicals Ltd. now have available a new range of amphoteric surface-active agents. These materials are manufactured by the Miranol Chemical Co. Inc., New Jersey, U.S.A., and have the following formula:



R is a fatty acid radical and the lauric, capric, stearic and coconut-oil derivatives are available.

The dicarboxylic analogue of the coconut derivative is also available and certain of these amphoterics may be supplied salt-free. In addition, various salts have been prepared, specifically designed to be incorporated in shampoos. Solutions of these modified amphoterics are said to be less harmful to the eyes than water alone.

Other industrial applications for these new chemicals, include moth-proofing, steam cleaning, oil tank degreasing and aluminium cleaning.

Improved corticosteroid

A new synthetic steroid which is said to combine high anti-inflammatory activity with lower side effects than other steroids is being marketed by Lederle Laboratories Division, Cyanamid of Great Britain Ltd. Called *Ledercort* triamcolone, it is 9 alpha-fluoro-16 alpha-hydroxy-prednisolone. It is indicated in the treatment of rheumatoid arthritis, respiratory allergies and dermatoses.

Ledercort is given orally. It is claimed to eliminate sodium and water retention and potassium loss, which have been important clinical problems in steroid therapy. Persons who could not be given ordinary steroid therapy because of oedema, hypertension or overweight have responded to *Ledercort* without side reactions. In some cases patients who developed these reactions with other steroids have been seen to lose their œdema or excess weight, and regain normal blood pressure levels when placed on *Ledercort*. The new steroid has also produced beneficial effects in the treatment of psoriasis and other chronic dermatoses.

It is stated that *Ledercort* is effective in the treatment of rheumatic syndromes in the same or lower doses than previously available steroids and in significantly lower doses in allergic syndromes. It is most active in the rheumatoid type of arthritis, although investigators have found it valuable in cases of osteoarthritis, fibrositis, acute bursitis and psoriatic arthritis. It is also active in allergic rhinitis and bronchial asthma and has been found useful in various lymphomatous diseases, such as leukaemia, lymphosarcoma and Hodgkin's disease. In the U.S. the drug is called *Aristocort*.

✶

Antileprosy drug

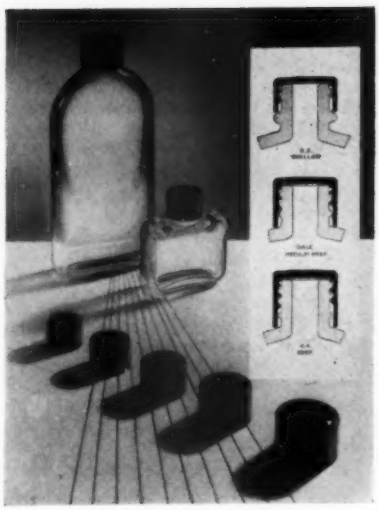
An antileprosy drug called *Ciba* 1906, a diphenyl thiourea compound, has been developed in that firm's laboratories in Summit, New Jersey, and in Switzerland.

Dr. T. F. Davey, head of the British Leprosy Research Unit Uzuakoli in Eastern Nigeria, tested *Ciba* 1906 for three years among leprosy victims in Africa. He reported in the January 1958 issue of *Leprosy Review* that it is "an antileprosy drug of considerable potential importance with outstanding qualities." According to Dr. Davey, the drug's clinical and bacteriological activity was satisfactory and it prevented residual skin scarring and disfigurement when used with other active medications. He stated also that it was especially effective in treating children because its nontoxic nature allowed them the same dosage as adults.

Packaging

New medium deep bottle caps ▶

◀ New poly-tainer polythene container



Rust remover in poly-tainers

Jenolite rust remover, previously sold in glass bottles, has now gone over to Poly-Tainers made by the Metal Box Co. The 3 oz. and 8 oz. sizes of *Jenolite* poly-tainer are bright red and have black printing and a black plastic screw-on cap. The 20 oz. size an oblong flask, is also made of red polythene with a black screw-on cap, and has the brand name and other wording embossed on it.

As far as the printing and embossing are concerned even the smallest wording—some of it in a type size slightly less than 5 pt.—is said to be perfectly legible.

★

Bottle caps

John Dale Ltd., who supply a range of R.3 shallow and R.4 deep plastic bottle caps are now offering a range of medium deep-skirted caps in 18 mm., 20 mm., 22 mm., 24 mm., and 28 mm. Like the R.4 deep cap, it screws down over the parison ring of the bottle and on to the shoulder, whereas the R.3 cap screws down to the parison ring without covering it. Because of the reduced depth this new cap, while possessing the same features as the deep R.4, will be correspondingly cheaper.

★

Polythene seal for glue tubes

For adhesive tubes Flexile Ltd. have developed a polythene *pop-on* seal which fits over the outside of the nozzle. There is also an internal plug so that the finger and thumb with which it is applied are kept out of contact with the adhesive.

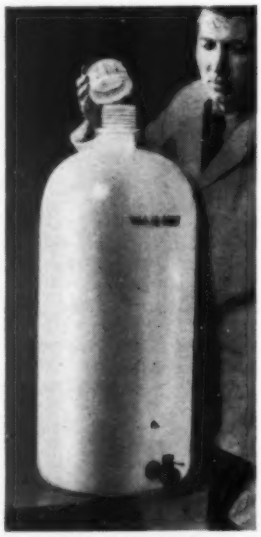
This seal is said to leave the nozzle clean and smooth for future use. Polythene cannot be "stuck" by most of the standard adhesives on the market and, say the makers, the *pop-on* seal is cheaper to produce than tubes with screw eyes. It is supplied on various sizes of tubes and in all standard colours of polythene.

Aerosol stencilling

An aerosol ink dispenser known as *Spray* can be used for stencilling boxes, bales, metal drums, etc. It is said to be quick drying, waterproof, and suitable for porous or non-porous surfaces.

It is always ready for use, without any preparation beyond a shake of the can. Cleaning, and replacement of brushes and preparation of solid stencil ink, are eliminated. No additional equipment is required.

Spray is marketed by J. and H. Rosenheim and Co.



Tool Treatments (Chemicals) Ltd. have added this one-piece polythene container to their " Black Knight " range. It has a capacity of 13 gal. The body is specially reinforced and threaded so that the plastic tap can be screwed in. Apart from the screw cap lid there is also an anti-splash rebate inside the lid making the container safe for transporting corrosive liquids. Lugs can be provided in the neck for fitting a plastic carrying handle.

Printed polystyrene tubes

The Plastics Group of the Metal Box Co. are supplying printed polystyrene tubes for the pharmaceutical industry.

One example are those containing I.C.I. *Savlon* throat lozenges.

The white opaque tube is printed in royal blue with the I.C.I. symbol, the brand name and directions for use. The polythene Pillar Pack stopper is light blue. On the underside it has three flexible prongs which hold the tablets gently in place. As there is no need for a cotton-wool plug time is saved in the packing.

Another firm using a printed polystyrene tube is the Ashe Laboratories Ltd. It contains their *Pro-Plus* pep-up tablets. In this instance the tube is transparent and tinted yellow, with black printing. The brand name is in reverse lettering on a black panel, and the closure is a white polythene stopper.

Ayrton Saunders Ltd. are using a white opaque polystyrene tube, printed in dark blue and with a transparent stopper, for their Dr. Monroe's Regulating Pills.

★

Self-adhesive name plates

John Gosheron and Co. Ltd. have produced a self-adhesive name plate which can be supplied in any shape or size. They are available in a variety of base materials, such as P.V.C. Ivorine, brass, alloy, aluminium, and a variety of finishes, satinised, anodised, etched or engraved. They are said to adhere successfully to most metals, wood, glass, plastic, rubber, and many other difficult labelling surfaces.

NEW PATENTS

COMPLETE SPECIFICATIONS ACCEPTED

Antibiotics

Salts of phenoxymethyl penicillin and methods for its production. *Lovens Kemiske Fabrik Ved. N. Konsted.* 796,359.

Process for recovering an antibiotic mystatin. *Olin Mathieson Chemical Corporation.* 796,512.

Salt of spiramycin with an organic arsenical compound. *Soc. des Usines Chimiques Rhône-Poulenc.* 796,486.

Antibiotic paromycin. *Parke, Davis and Co.* 797,568.

Steroids

9-α-halo-steroids and process for manufacturing them. *Schering Corp.* 794,468.

Steroids and their preparation. *C. Pfizer and Co. Ltd.* 795,101, 795,102 and 795,103.

Process for preparing a steroid. *Ciba Ltd.* 793,851.

Process for the manufacture of dehydrogenation compounds of the pregnane series. *Ciba Ltd.* 794,660.

Steroid compounds and process. *Upjohn and Co.* 794,483, 794,484 and 794,485.

Steroid compositions and their preparation. *Upjohn and Co.* 794,486.

Steroid ester, its salts and pharmaceutical compositions containing them. *Syntex Soc. Anon.* 796,007.

Pharmaceuticals

Method for the synthesis of phenanthridine. *Boots Pure Drug Co. Ltd.* 796,951.

Fungicidal and bactericidal preparations. *Farbwerke Hoechst.* 797,073.

Fungicides. *Fahlberg-List Ges.* 796,399.

Therapeutically valuable cysteine compounds. *Recherches et Propagande Scientifiques.* 797,507.

Piperidine compounds and their production. *MacFarlane and Co. Ltd.* 797,449.

Synthesis of steroids. *Olin Mathieson Chemical Corporation.* 796,386.

Production of Vitamin B_{12}. *Richter Gedeon Vegyeszeti Gyar.* 797,176.

Manufacture of carotenoids. *Hoffmann-La-Roche and Co. A.G.* 797,635.

Cosmetics and toilet preparations

Hair treating compositions. *Devon Cold Wave Co. Ltd.* 797,167.

Aerosol spray hair fixatives and process for their manufacture. *Ciba Ltd.* 796,319.

Process for the production of a pearly lustre in hair wash concentrates. *Dehydag Deutsche Hydrierwerke Ges.* 797,625.

Dyestuffs

Anthraquinone vat dyestuffs and process for making them. *Ciba Ltd.* 794,849.

Manufacture of polyazo-dyestuffs. *Farbwerke Hoechst A.G. Vorm Meister, Lucius and Brüning.* 795,232.

Diazoamino compounds and process for making them. *Ciba Ltd.* 795,339.

Cobaltiferous dyestuffs of the benzenemonoazo-pyrozaline series. *Imperial Chemical Industries Ltd.* 793,712.

Production of monoazo dyestuffs containing chromium. *Badische Anilin- und Soda-Fabrik A.G.* 794,473.

Pigmented compositions and colouring of textiles. *Rohm and Haas Co.* 791,767.

Monoazodyestuffs of the benztriazole series and metal complexes thereof. *Farbenfabriken Bayer A.G.* 796,738.

Monoazodyestuffs complex heavy metal compounds thereof, and their use. *Geigy A.G.* 796,350.

Chromium complex compounds of monoazo pyrazolone dyestuffs. *Sandoz Ltd.* 796,296.

Anthraquinone dyestuffs. *Imperial Chemical Industries Ltd.* 797,383.

Copper-containing triazo dyestuffs. *Farbenfabriken Bayer A.G.* 796,397.

Metallised mono azo dyestuffs of the benzene-azo-pyrasolone series. *Imperial Chemical Industries Ltd.* 792,206.

Water - insoluble mono azo dyestuffs. *Sandoz Ltd.* 792,025.

Production of dyestuffs of the anthraquinone series. *Badische Anilin- and Soda-Fabrik A.G.* 790,728.

Miscellaneous

Method of removing colour from solutions of hydrogen peroxide. *Columbia-Southern Chemical Corp.* 795,433.

Process for recovering amines from the residues in the production of aromatic isocyanates. *Farbenfabriken A.G.* 795,639.

Process for the manufacture of α β-unsaturated aldehydes. *Hoffman-La Roche and Co. A.G.* 795,227.

Preparation of amino acids. *C. Pfizer and Co. Inc.* 795,178.

Higher fatty alcohols. *California Research Corp.* 795,181.

Ampoule for use in an injection syringe. *E. Zimmerman.* 795,839.

Organic compounds containing phosphorus and sulphur compositions containing them. *Monsanto Chemical Co.* 795,396.

Insecticidal esters of dithiophosphoric acid. *Sandoz Ltd.* 795,340.

Fungicidal compositions. *Armour and Co.* 793,749.

Organic nitrogen compounds and process for producing them. *Parke, Davis and Co.* 793,899.

Therapeutic compositions. *Upjohn and Co.* 794,488.

Manufacture of monochloracetic acid. *Dow Chemical Co. Ltd.* 793,712.

Compounds and plant growth regulating compositions containing them. *N/V de Bataafsche Petroleum Maatschappij.* 794,621.

Chemical reactor. *Chempatents Inc.* 791,631.

Separation of potassium and sodium ions from a mixture of sodium and potassium chlorides. *Soc. d'Etudes Chimiques pour l'Industrie et l'Agriculture.* 791,410.

Shampoo leaves and a method of producing them. *Safodik (Great Britain) Ltd.* 790,492.

Reduction of aromatic nitrogen compounds. *Allied Chemical and Dye Corp.* 796,421.

Lipoamide. *Merck and Co. Inc.* 796,563.

Lipol. *Merck and Co. Inc.* 796,564.

Manufacture of unsaturated aldehydes. *Hoffman-La-Roche and Co. A.G.* 797,300.

Amides of trialkoxybenzoic acids. *Brittol Laboratories Inc.* 797,476.

Basic esters of thiophosphonic acids and salts thereof. *Imperial Chemical Industries Ltd.* 797,603.

Extraction and purification of sapogenins. *Glazo Laboratories Ltd.* 797,384.

Process for the production of polymeric functional derivatives of acrolein. *Deutsche Gold- und Silberscheideanstalt Vorm Roessler.* 797,459.

NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd., company registration agents, Chancery Lane, London, W.C. 2.

Rushton Pharmacies Ltd. 19.3.58. 1088 Stratford Road, Hall Green, Birmingham 28. £15,000. Dirs.: Dora M. and Norman F. Rushton, and Arthur R. Mason.

B. F. Constable (Chemists) Ltd. 20.3.58. 2 Cooper Street, Manchester 2. £1,000. Dirs.: Bernard F. and Mrs. Jean Constable.

Winifred Atwell Salon Ltd. 20.3.58. Manfrs. of and dlrs. in toilet preparations and articles, etc. £100. Subs.: Stanley R. C. Stock, 8 St. Paul's Mansions, London, W.6 and Arthur J. R. Edwards.

Kent's Chemists Ltd. 21.3.58. 45 St. Helens Road, Swansea, to take over bus. cd. on as "Kent's" at Swansea. £2,000. Dirs.: Trevor M. and Gherit E. Rees.

H. E. Helman and Co. (Insecticides) Ltd. 24.3.58. Woodlands, Culverstone, Meopham, Kent. £20,000. Dirs.: Henry E. Helman, Chas. F. Bint, Donovan R. de Lacey and Leonard E. Downer.

Lincolne Sutton and Wood Ltd. 17.3.58. Clarence House, 6 Clarence Close, Norwich. Analytical and consulting chemists, etc. £4,000. Dir.: Eric C. Wood.

Brown and Jay Ltd. 26.3.58. 21 Market Hill, Sudbury, Suffolk. Dispensing chemists and dlrs. in drugs, etc. £5,000. Dirs.: Charles and Mrs. Freda C. Dawson.

A. J. Cope and Sons Ltd. 27.3.58. Manfrs. of and dlrs. in scientific, surgical and laboratory glassware products, etc. £10,000. Subs.: Reginald H. Cope, 124 Kings Hall Road, Beckenham, Kent, and Wm. T. Harvey.

G. T. Chemicals Ltd. 25.4.58. £100. Dir.: Leon G. Leanse. Subs.: Lawrence M. Seltser, 11c Oxford and Cambridge Mansions, London, N.W.1, and Robert W. L. Harrison.

Billington and White Ltd. 28.4.58. 125 Sheffield Road, Barnsley. Chemists, etc. £6,000. Dirs.: Hubert Billington and Thomas White.

Billington and Booth Ltd. 28.4.58. 46 Eldon Street, Barnsley. Chemists, etc. £6,000. Dirs.: Hubert Billington and Douglas Booth.

Frith Bros. Ltd. 28.4.58. 39A George Street, Richmond, Surrey. Chemists, druggists, etc. £10,000. Dirs.: George A. and John E. Frith.

S. A. Jackson (Chemists) Ltd. 15.4.58. 9 Chapeltown Road, Leeds 7. £3,000. Dirs.: Alan Gowers and Harold M. Jackson.

M. A. Phillips and Associates Ltd. 16.4.58. 22 Western Road, Romford, Essex. Consulting chemists, consulting chemical engrs., etc. £100. Dirs.: Montague A. and Mrs. Helena M. M. Phillips.

Rich-Almonds Ltd. 16.4.58. Chemists and druggists, and buyers, sellers and dealers in raw materials, etc. £100. Dirs.: Peter B. and Mrs. Harriet E. Richardson, 45 Rowan Avenue, Boothville, Northampton.

McNeil Laboratories Ltd. 17.4.58. Manfrs. of and dlrs. in pharmaceuticals, ethical or otherwise, chemicals, medicines, medical preparations, etc. £50,000. Subs.: David N. Aylett and P. J. Bunyan, 18 Austin Friars, London, E.C.2.

NEW TRADE MARKS

APPLICATIONS

Cosmetics and toilet preparations

SEB.—768,070. *Genatosan Ltd.*

FLORASYNTH.—773,045. *Florasynth Laboratories Inc.*

MILAIR.—773,580. *Haering and Co. Odol-Fabrik, Kosmetische Produkte.*

CHANEL NO. 5.—755,743. 755,744, 755,745. *Chanel Ltd.*

PINK HEAVEN.—773.594. *Revlon Inc.*

SHE.—773,912. *Thomas Hedley and Co. Ltd.*

DERBALINE. — 774,216. *Roberts Windsor Soap Co. Ltd.*

FLEXI.—774,323. *Charles Alexander and Co. Ltd.*

PECHE PERMIS.—772,855. *Société Maurice Blanchet Parfums de Luxe.*

VALCREMA.—772,657. *Dae Health Laboratories Ltd.*

TERCI.—746,496. *Eau de Cologne and Parfumerie-Fabrik, Glockengasse No.* 4711, *Gegenuber der Pferdepost Von. Ferd. Mülhens.*

WEEK-ENDER.—770,460. *Lentheric Ltd.*

AMOUR-AIDE.—774,219. *Frigicold Ltd.*

Pharmaceuticals

DIMICEL.—770,932. *Parke, Davis and Co.*

PHENAGLATE.—772,084. *A. and G. Nicholas Ltd.*

CORLAN.—773,718. *Glaxo Laboratories Ltd.*

KOLPOLYN. — 774,065. *Organon Laboratories Ltd.*

PREDOTION. — 774,070. *Organon Laboratories Ltd.*

EF-CORLAN.—774,078. *Glaxo Laboratories Ltd.*

SEDIONEX.—774,315. *Clinical Products Ltd.*

HYDROSARPAN. — 774,319. *Biofarma, Société Anonyme.*

AMOMA.—774,556. *Glaxo Laboratories Ltd.*

OTOSPORIN. — 764,120. *Wellcome Foundation Ltd.*

MORPHIONEX.—771,810. *Clinical Products Ltd.*

NUPAX.—B772,228. *Boots Pure Drug Co. Ltd.*

SWEETONA.—772,323. *Boots Pure Drug Co. Ltd.*

CURUMIN.—772,665. ACTOMAL.—772,707. *Imperial Chemical Industries Ltd.*

PLENIRON.—773,805. *Thomas Kerfoot and Co. Ltd.*

BENTODEX.—773,749. *C. L. Bencard Ltd.*

FENAROL.—773,991. *Winthrop Products Inc.*

CODETTES. — 774,048. *Imperial Chemical Industries Ltd.*

PRETEN.—772,081. *A. and G. Nicholas Ltd.*

MYASUL.—771,846. *Parke, Davis and Co.*

ADCORTYL.—773,480. *E. R. Squibb and Sons Ltd.*

BOLVIDON. — 774,062. *Organon Laboratories Ltd.*

VESPRAL.—774,092. *E. R. Squibb and Sons Ltd.*

BANTRON.—765,349. *Campana Corp.*

LEDERCORT.—769,061. *American Cyanamid Co.*

DOMIDON. — 771,452. *Ward, Blenkinsop and Co. Ltd.*

PLEMOCIL.—771,773. *Società Farmaceutici Italia.*

ALEVACOL.—771,932. *Boots Pure Drug Co.*

MEPACLORIN.—772,664. *Imperial Chemical Industries Ltd.*

VITADIEM.—772,740. *Marfleet Refining Co. Ltd.*

RONAINE.—771,173. *Rona Laboratories Ltd.*

ANCOFFEN.—773,626. *British Drug Houses Ltd.*

VERACTIL.—772,709. *May and Baerk Ltd.*

MASCETYN.—767,710. *Parke, Davis and Co.*

NEUTRAPEN.—768,660. *Schenley Laboratories Inc.*

ALEVOCOL.—771,933. *Boots Pure Drug Co. Ltd.*

LINGRIL.—772,383. *The Wellcome Foundation Ltd.*

HALSAN.—772,416. SAVLOIDS.—772,417. *Imperial Chemical Industries Ltd.*

ORGADERM.—772,629. *Organon Laboratories Ltd.*

VALLERGAN.—772,708. *May and Baker Ltd.*

ANTICOMAN.—B638,762. *Riddell Products Ltd.*

VIO.—764,946. *Hedges (Chemists) Ltd.*

PRUNIJILS.—766,653. *Wallace Manufacturing Chemists Ltd.*

Disinfectants, fungicides, weedkillers, etc.

PRACTO. — 773,371. *Dustall and General Products Co.*

SEVIN.—773,414. *Union Carbide Corporation.*

FISONS.—772,169. FISONS 18-15.—772,170. *Fisons Ltd.*

RENTOFAB.—773,386. *Rentokil Ltd.*

MALATHEXO.—767,023. *Pan Britannica Industries Ltd.*

CLEVONE. — 771,380. POTENE. — 771,382. PATHMASTER. — 770,354. VERGEMASTER.—770,355. *Burt, Boulton and Haywood Ltd.*

DISFEX.—769,472. *Pigot and Smith Ltd., trading also as Gardner Products Co.*

AIRGAY. — 770,268. *Proprietary Chemicals Ltd.*

DETHIX.—773,059. *Imperial Chemical Industries Ltd.*

DUSTOX.—772,435. *J. W. Chafer Ltd.*

MALINOX.—772,551. *Burt, Boulton and Haywood Ltd.*

PROMOL.—771,418. *Promedico Products Ltd.*

Detergents, polishes and bleaches

DAIRYMAID.—773,508. *Joseph Crosfield and Sons Ltd.*

TIDE.—773,085. *Thomas Hedley and Co. Ltd.*

MAPLON.—771,388. *Ivan Hirschler.*

HOMOZONE.—772,234. *Samuel Wachsman.*

WINKIE.—772,861. *Donald Josephs Ltd.*

DERTOLIT.—773,241. *South American Minerals and Products Co. Ltd., trading also as Exsud.*

New patents are from the *Journal of Patents*, and new trade marks are from the *Trade Marks Journal*. In each case permission to publish has been given by the controller of Her Majesty's Stationery Office. Each of the publications mentioned is obtainable from the Patent Office, 26 Southampton Buildings, London, W.C.2.

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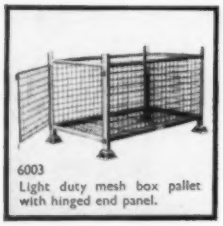
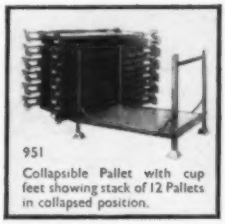
494
Mesh box type pallet with half-hinged front panel.

3011
Flat semi-mobile stillage with "Towlever" capacity 15 cwt.



6003
Light duty mesh box pallet with hinged end panel.

937
Reversible flat/post pallet, two-way entry, tubular posts.



951
Collapsible Pallet with cup feet showing stack of 12 Pallets in collapsed position.

4006
Bin type pallet with half hinged front capacity 5—40 cwt.

412
Lightweight Post-type Pallet for carboy handling.

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Stackable box-type Pallet with wheels and towing attachment.

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Handles any rectangular shaped article with measurements in the size range from 2″x1″x⅜″ to 5″x2½″x1″

VERSATILE. The change-over from one size of pack to another can be quickly and easily carried out by the operator.

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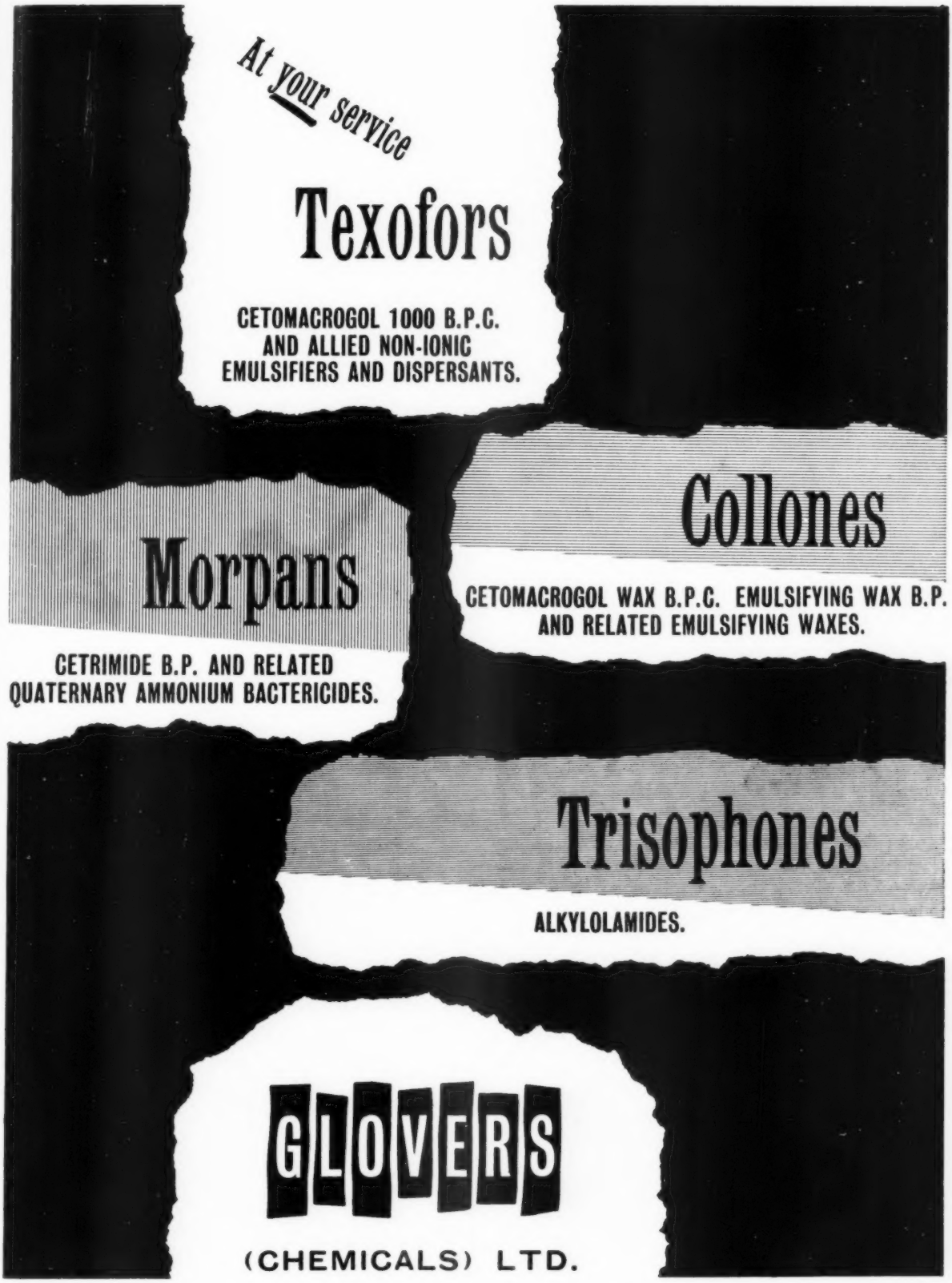

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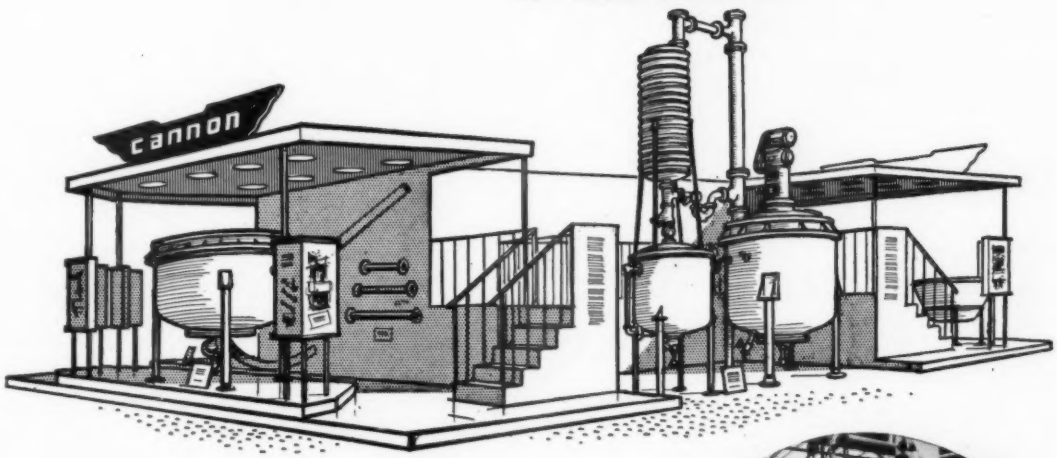
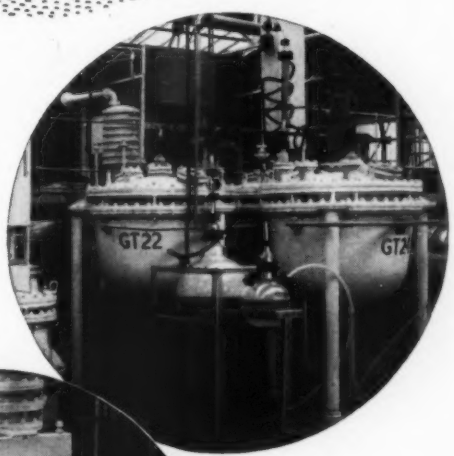
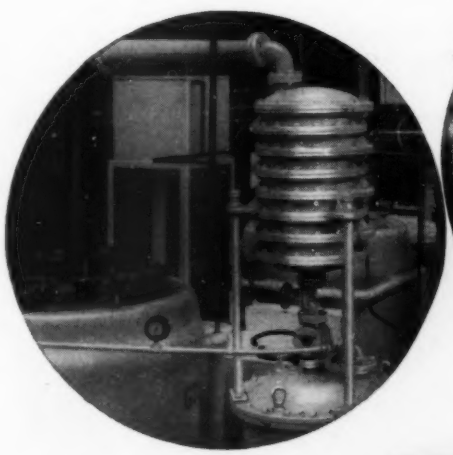


On Stand No. 8 GRAND HALL, OLYMPIA– Chemical and Petroleum Engineering Exhibition CANNON are displaying a wide range of equipment as used in the Chemical and Allied Industries. Our Senior Technical Executives will be available throughout the Exhibition to advise on your particular requirements.





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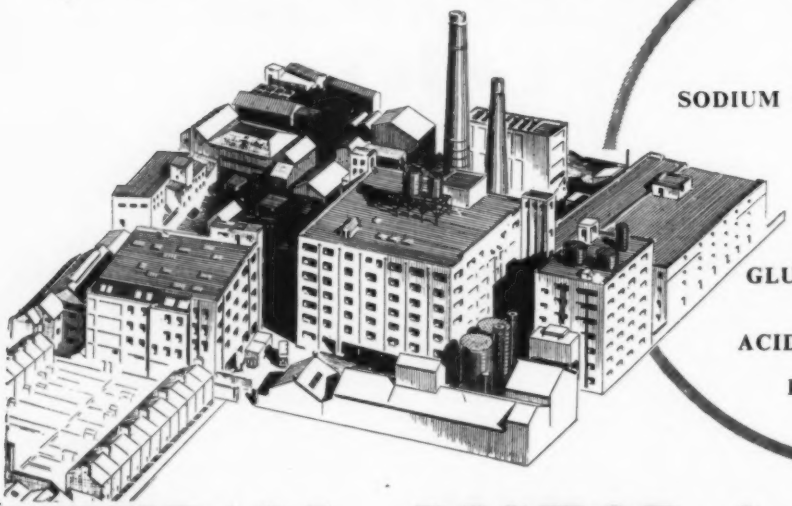

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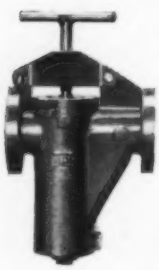

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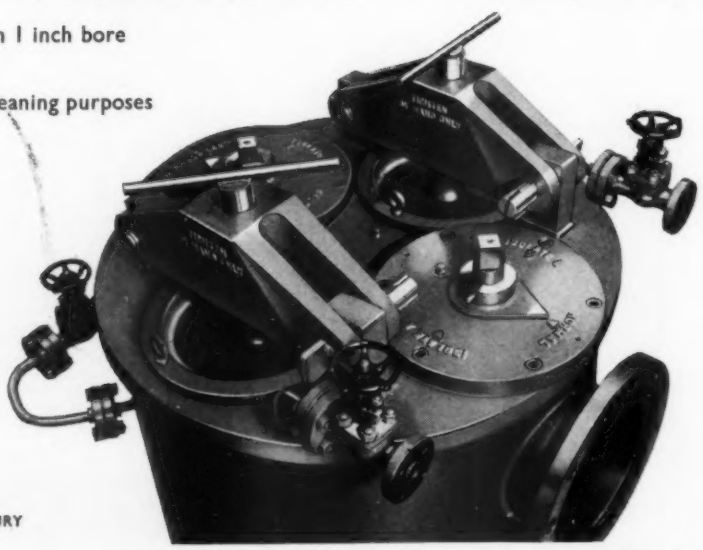

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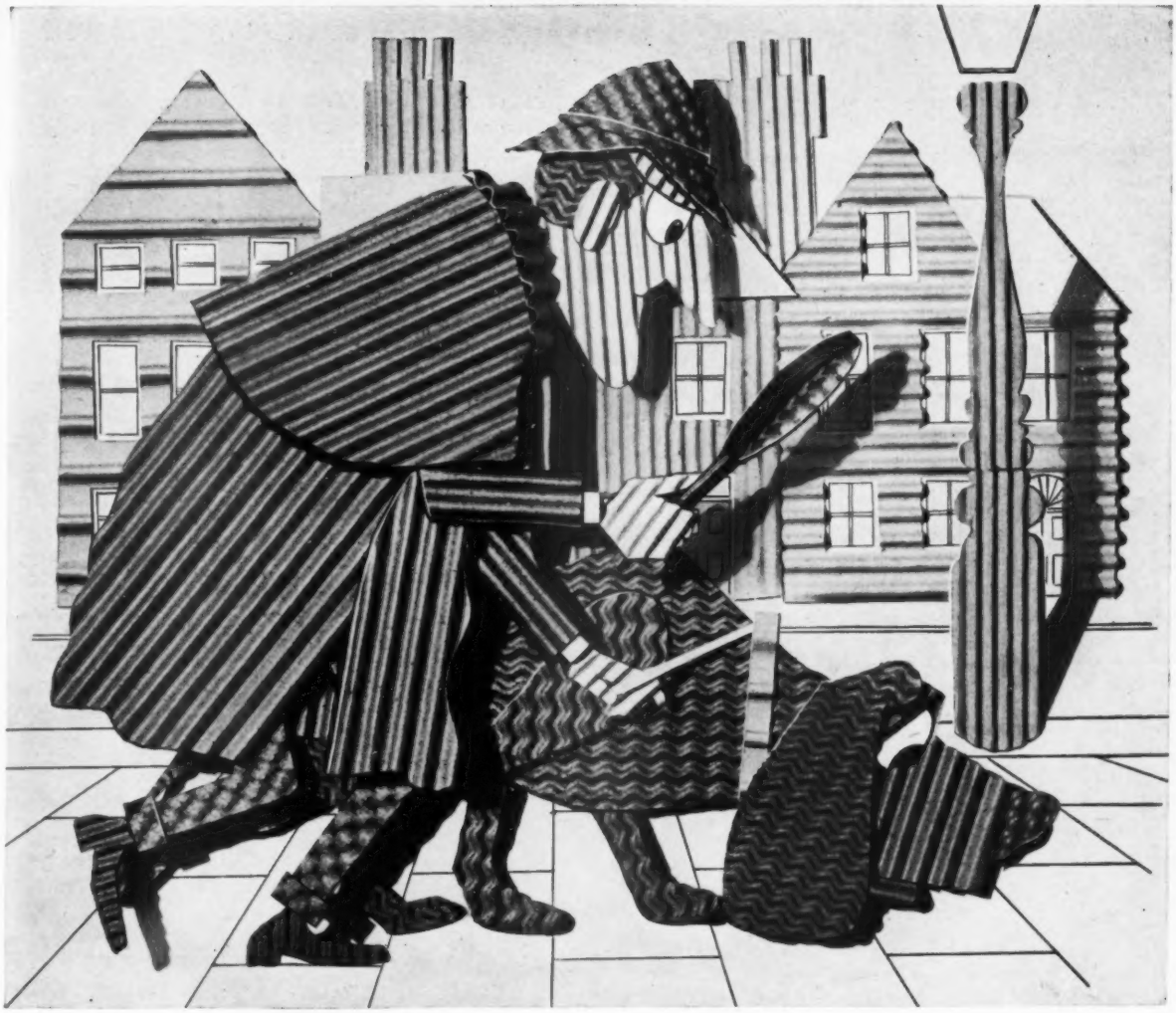

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A typical Kestner-Fakler Acid Recovery Plant used for recovering waste pickle liquor in the Iron and Steel Industry

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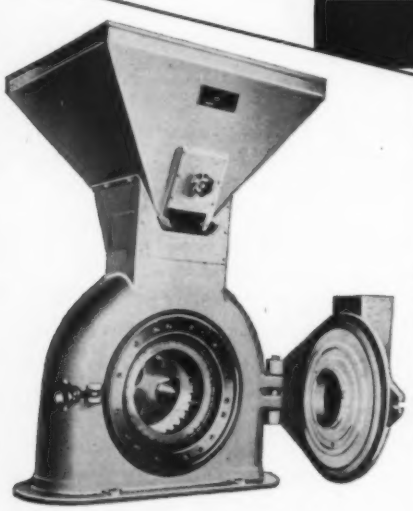

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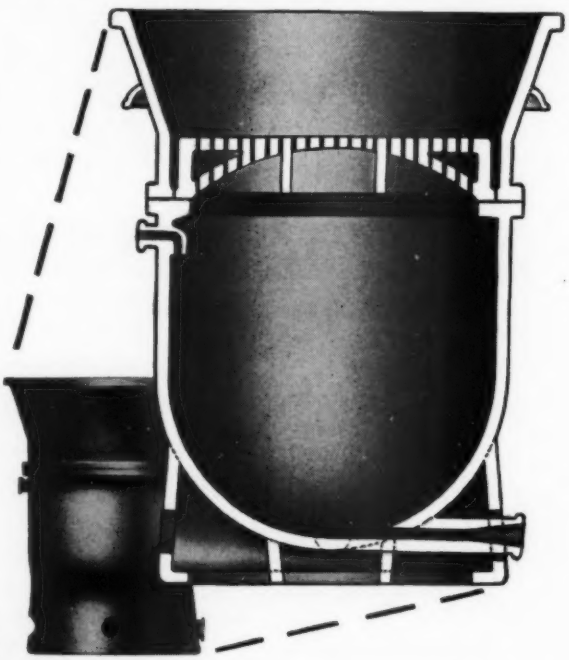

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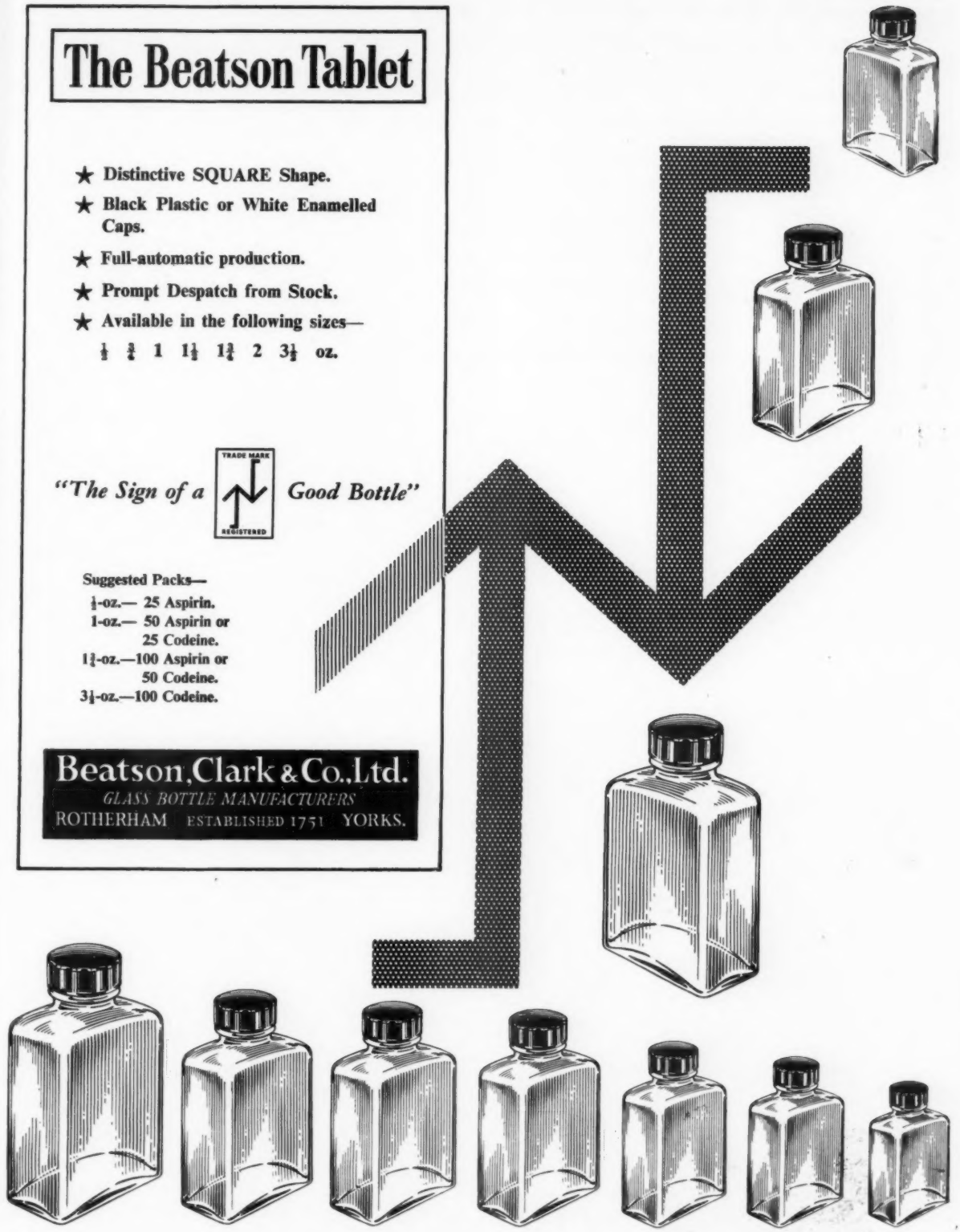

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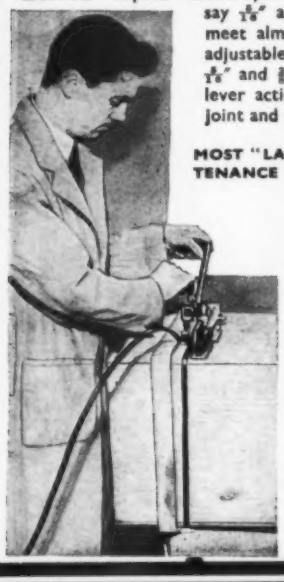
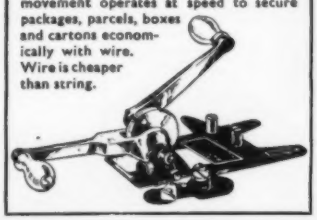


MOST "LAWCO" TOOLS SUPPLIED ON MAINTENANCE HIRE AT SMALL WEEKLY RENTAL.

PILFER-PROOF PACKS

Here is another 100% tool that saves money in the Despatch Department and frustrates pilferers. Simple lever movement operates at speed to secure packages, parcels, boxes and cartons economically with wire. Wire is cheaper than string.



On right is illustrated one of our carton stapling machines fixing "flats" at speed. There's no risk of moisture failures when cartons are wire stitched instead of taped.

Below is air or hand operated "Heftnailer" securing "Venesta" case for export. Works at machine-gun speed driving staples up to 1" deep.

LAWCO MODEL "A"

The tool for stapling bottoms of deep cartons Strongly; Quickly; Cheaply.

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ACID RESISTING AUTOCLAVE

built entirely in Keebush

This Digester is designed to handle hot hydrochloric acid and illustrates one of the many applications of **Keebush** acid resisting material.

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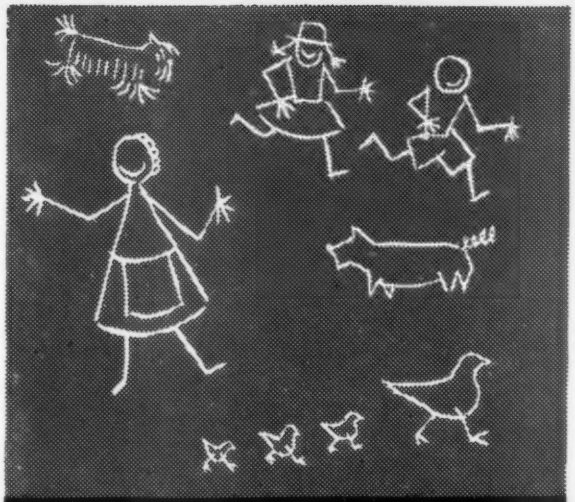

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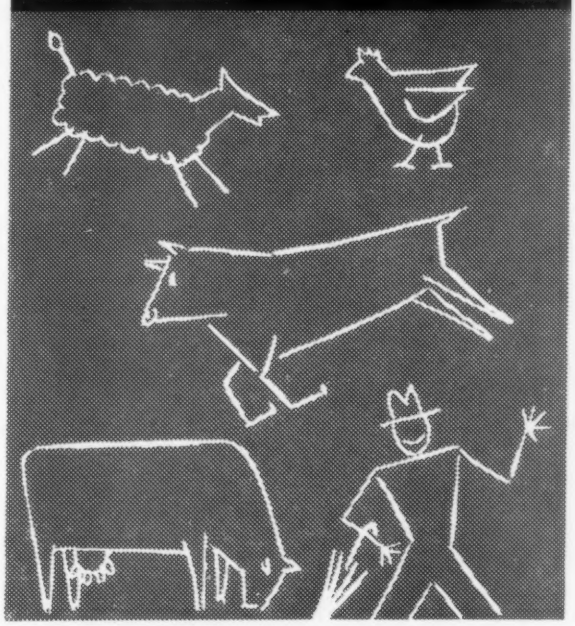

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NEEDS NO FILE

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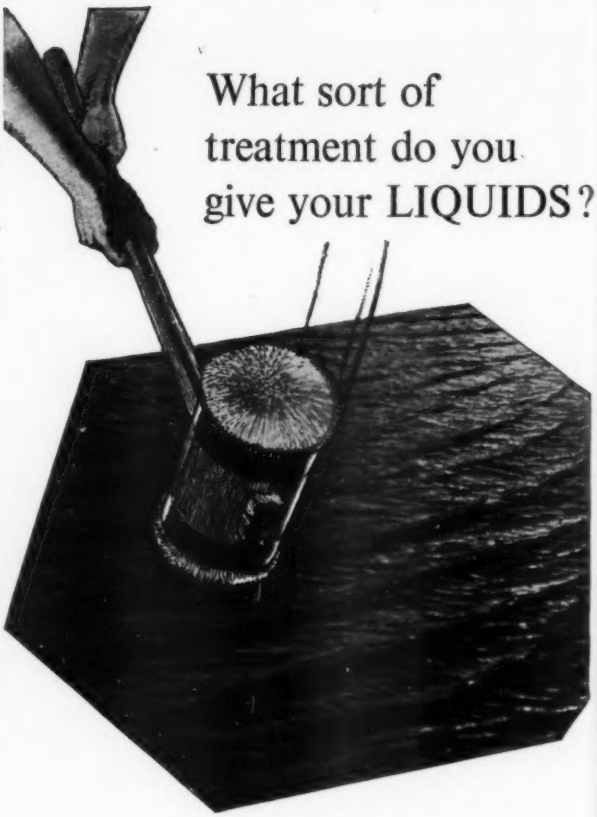

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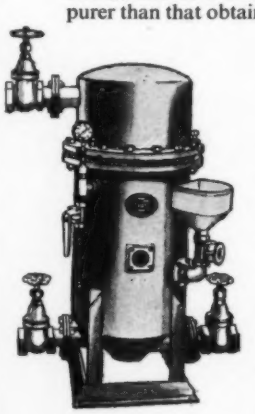

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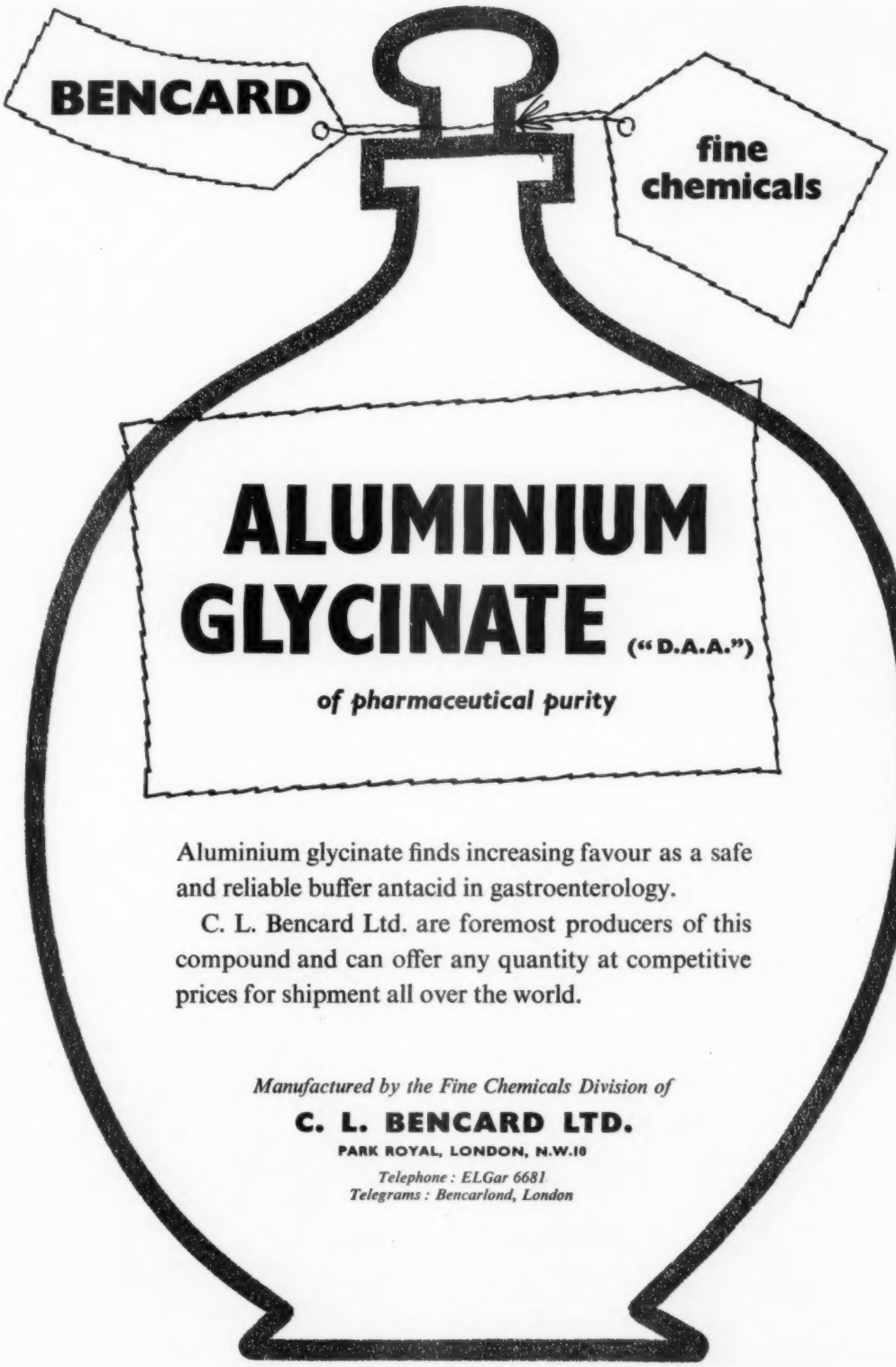

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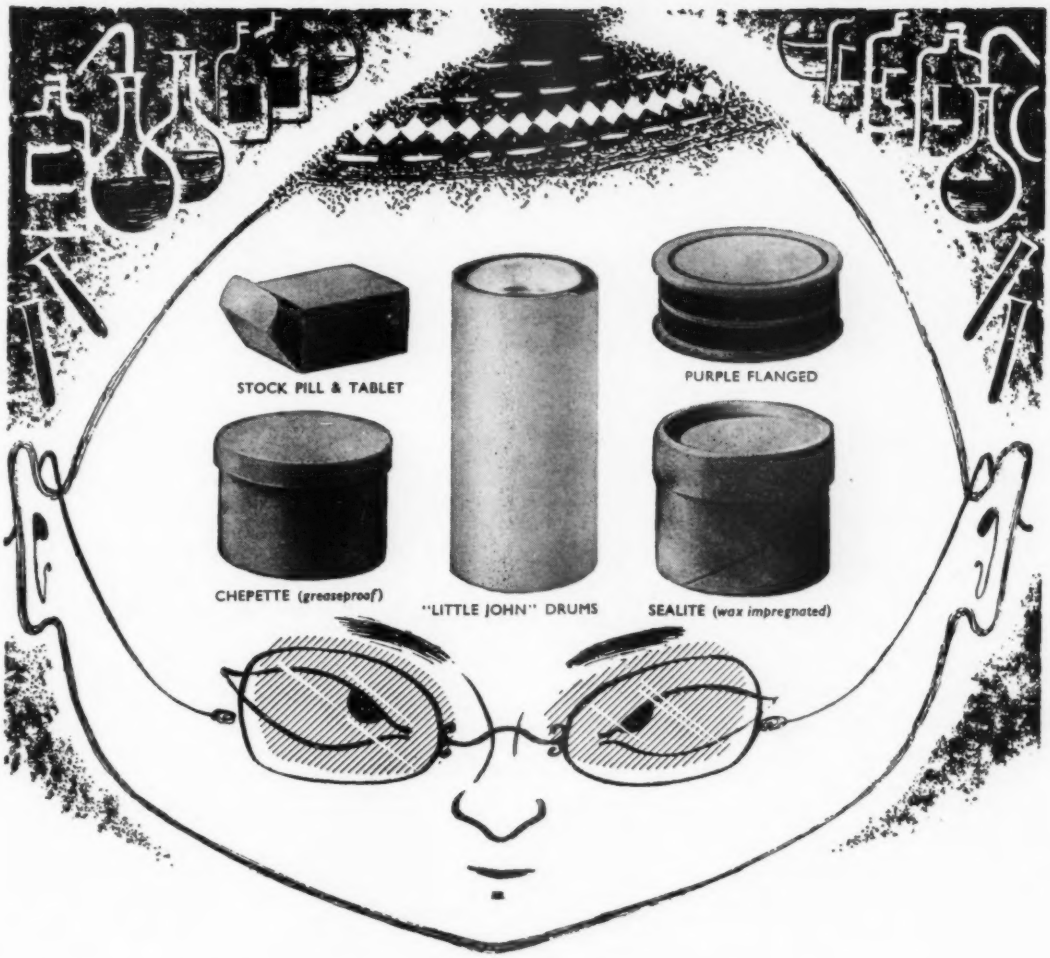

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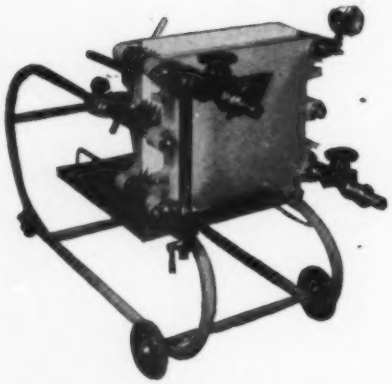

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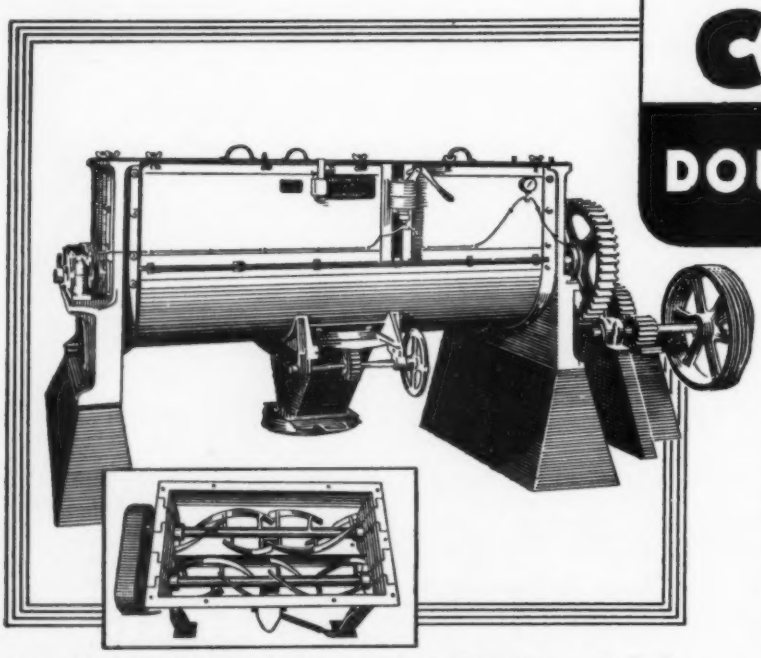

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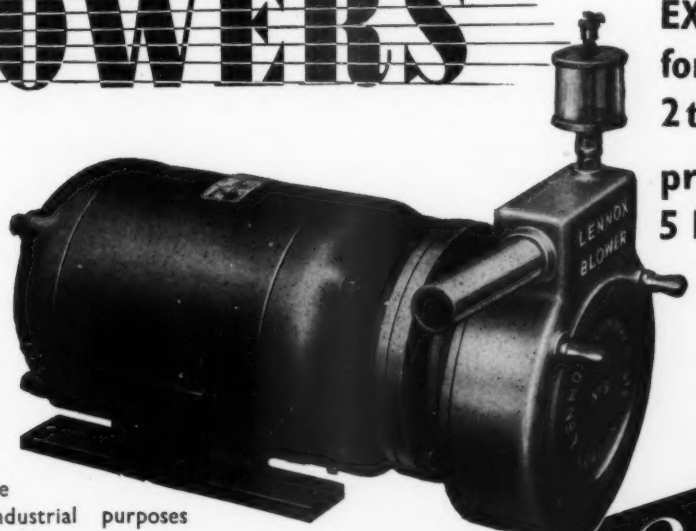

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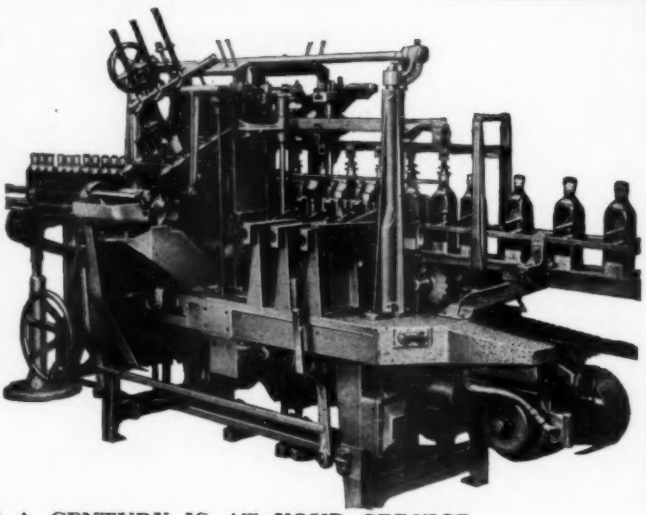

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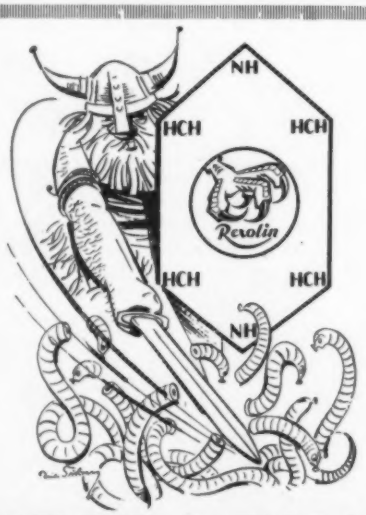

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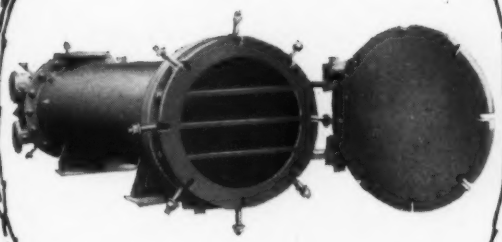

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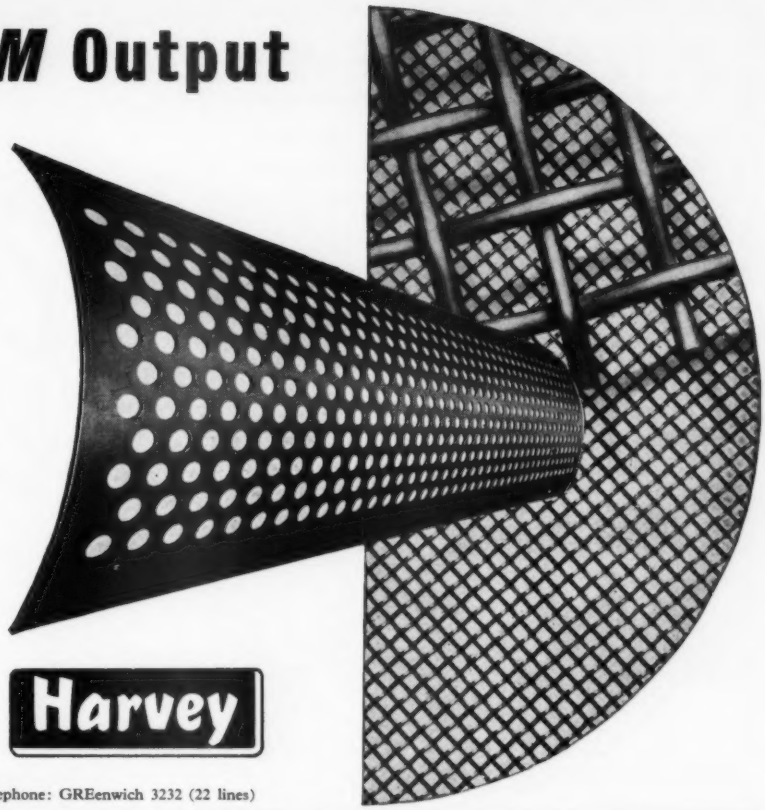

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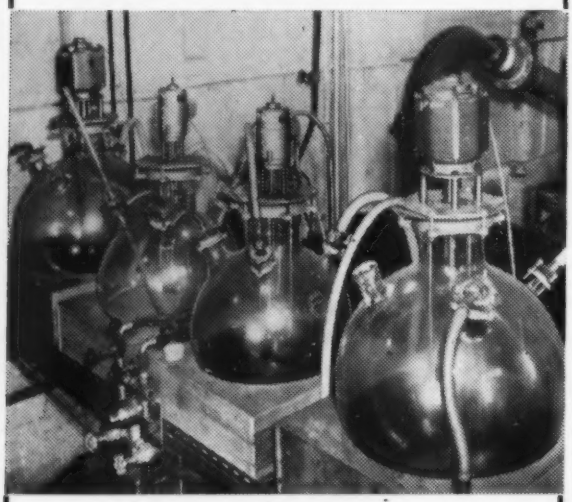

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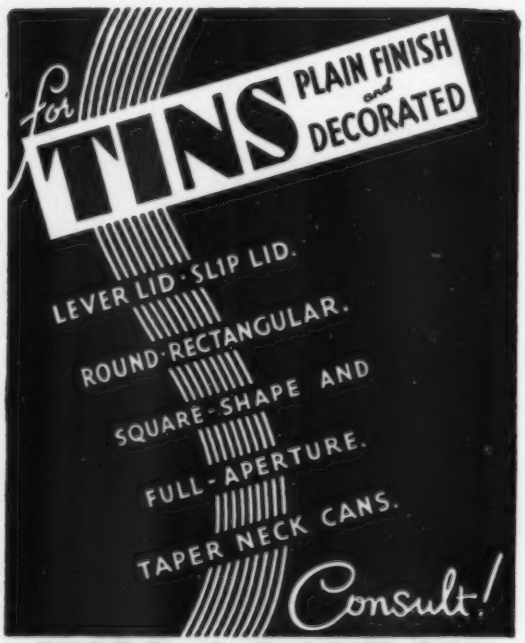

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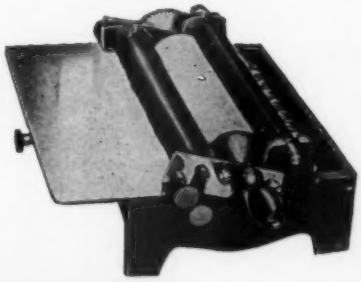

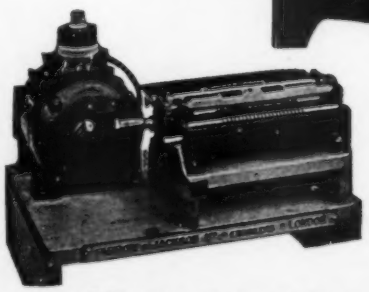

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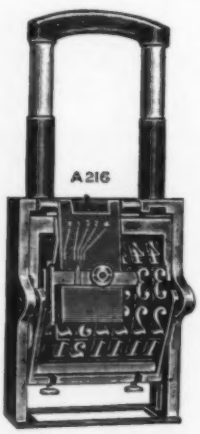

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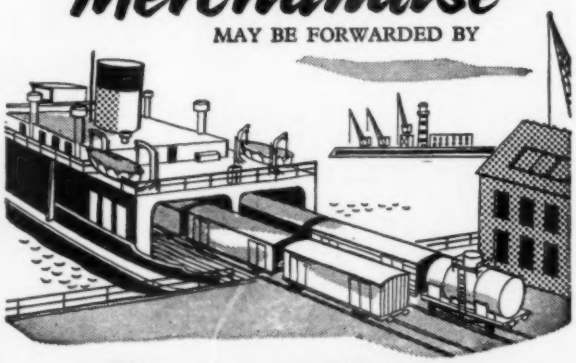

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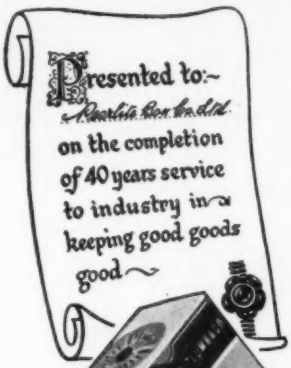

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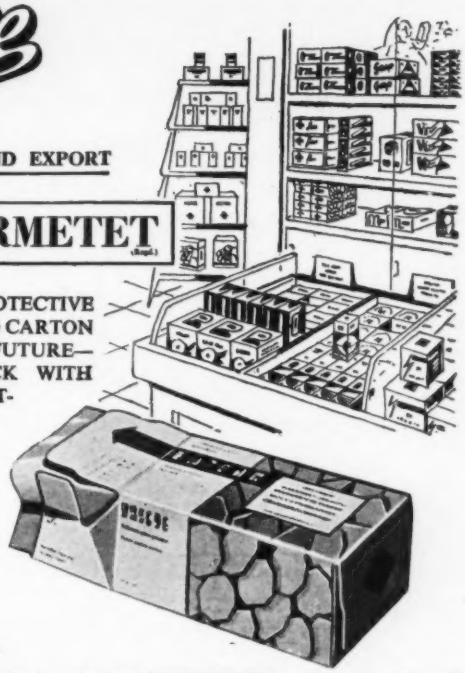

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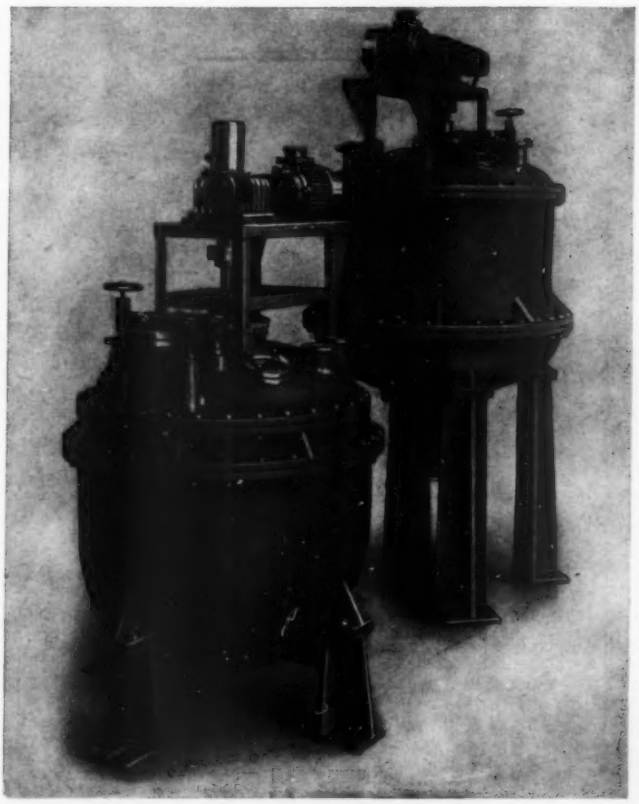

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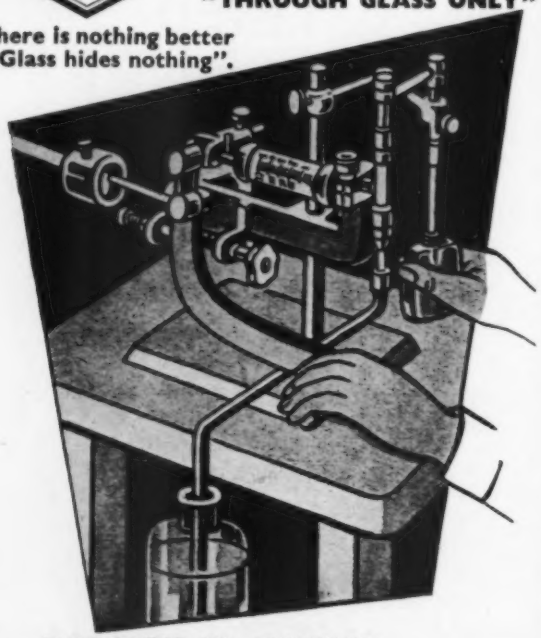

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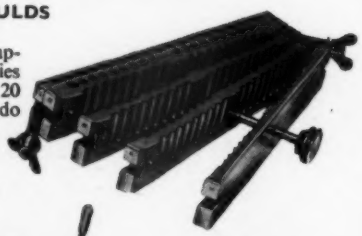

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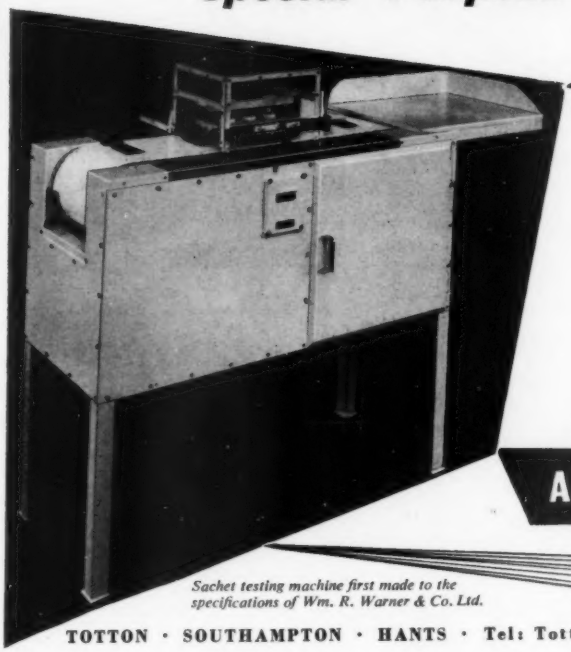

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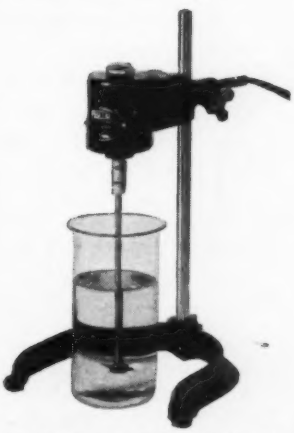

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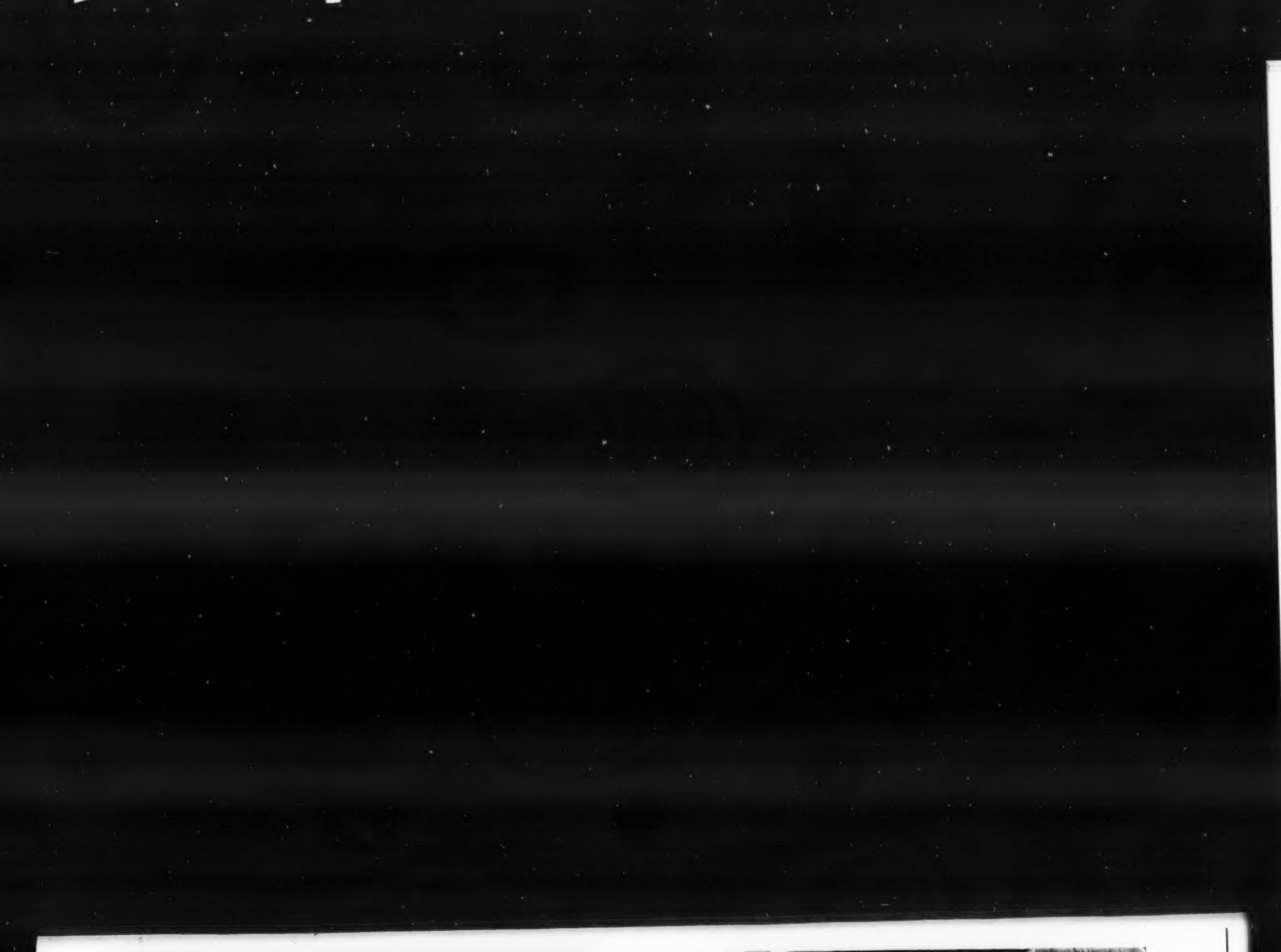
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